

# VAX-11/780

# Installation Manual

Prepared by Educational Services  
of  
Digital Equipment Corporation

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## PREFACE

### SCOPE

This manual provides installation procedures for a standard VAX-11/780 and its options, the BA11-K expander box and distribution panel, as well as the UNIBUS VAX-11/780 CU/CV. It also describes the conversion of a UNIBUS VAX-11/780 to a standard VAX-11/780.

The manual is divided into four parts:

Part I	– Standard VAX-11/780
Part II	– Options
Part III	– UNIBUS VAX-11/780 CU/CV
Part IV	– UNIBUS VAX-11/780 Conversion to Standard VAX-11/780

A list of related manuals follows.

Title	Document Number
MA780 Multiport Memory Technical Description	EK-MA780-TD
DR780 General Purpose Interface Technical Description	EK-DR780-TD
FP780 Floating-Point Accelerator Technical Description	EK-FP780-TD
DW780 UNIBUS Adapter Technical Description	EK-DW780-TD
MS780 Memory System Technical Description	EK-MS780-TD
KC780 Console Interface Technical Description	EK-KC780-TD
RH780 MASSBUS Adapter Technical Description	EK-RH780-TD
Power System Technical Description	EK-PS780-TD
Diagnostic System Technical Description	EK-DS780-TD
TB/Cache/SBI Control Technical Description	EK-MM780-TD
KA780 CPU Technical Description	EK-KA780-TD
DR780 General Purpose Interface User's Guide	EK-DS780-UG
VAX-11/780 Diagnostic System User's Guide	EK-DS780-UG
VAX-11 Diagnostic System User's Guide	EK-VX11D-UG
System Hardware User	EK-11780-UG
VAX-11 Diagnostic Design Guide	EK-1VAXD-TM

**PART I**  
**Standard VAX-11/780**

# CHAPTER 1

## INSTALLATION

### 1.1 UNPACKING AND INSPECTION

1. Check all boxes for external damage (dents, holes, smashed corners).
2. Notify the customer of any damage and list it on the Labor Activity Reporting System (LARS) report form (Figure 1-1). Include a note to clarify the extent of the damage.
3. Make sure all containers are sealed.

#### NOTE

**Any opened packages or cabinets should be called to the attention of the customer and documented on the LARS report.**

4. Remove the shipping/accessory list in the “Open Me First” box and inventory the contents of all boxes against the shipping list.
5. Notify the branch manager or branch supervisor of any missing or incorrect items. Advise the customer to contact the carrier about any missing items.
6. Inform the branch service manager of the DIGITAL Traffic and Shipping Department if the carrier does not have the missing items.
7. Cut and remove strapping from the cabinet boxes.
8. Remove the cabinet boxes.
9. Install four leveling feet (Figure 1-2) on the cabinets using a 9/16-inch wrench. Use the hex nuts and washers that were removed with the four red shipping brackets.

### 1.2 CABINET DISASSEMBLY PROCEDURES

The cabinets must be partially disassembled prior to being integrated into a system.

#### 1.2.1 CPU Cabinet Partial Disassembly

1. Remove the two orange wheel lock assemblies from the CPU cabinet (Figure 1-3).

PRINT CHARACTERS IN THIS MANNER:

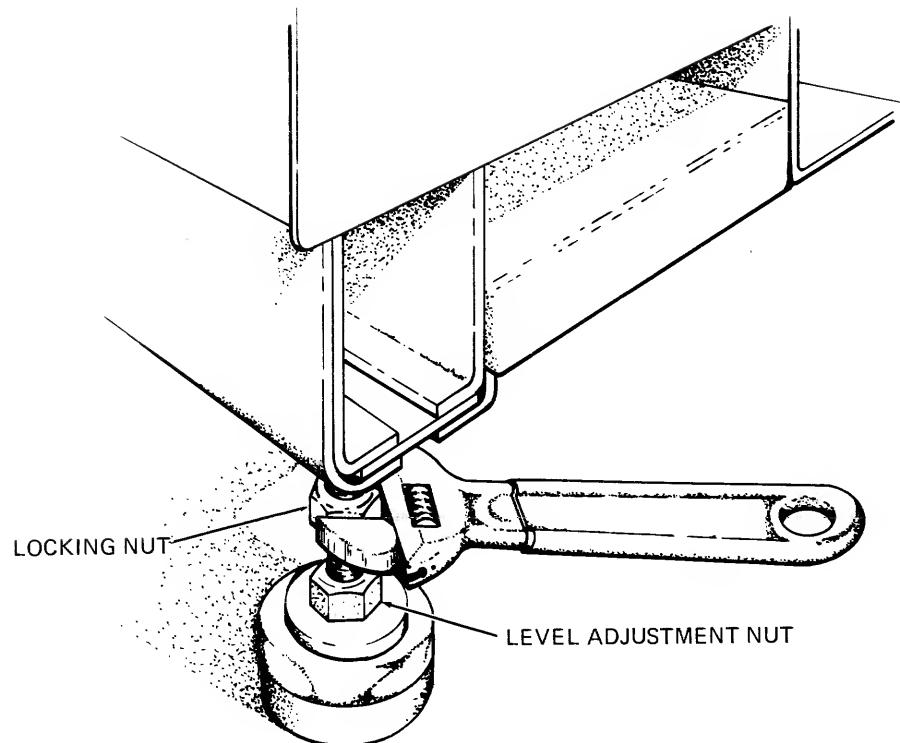
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z 1 2 3 4 5 6 7 8 9 0

**digital**

**LARS REPORT**

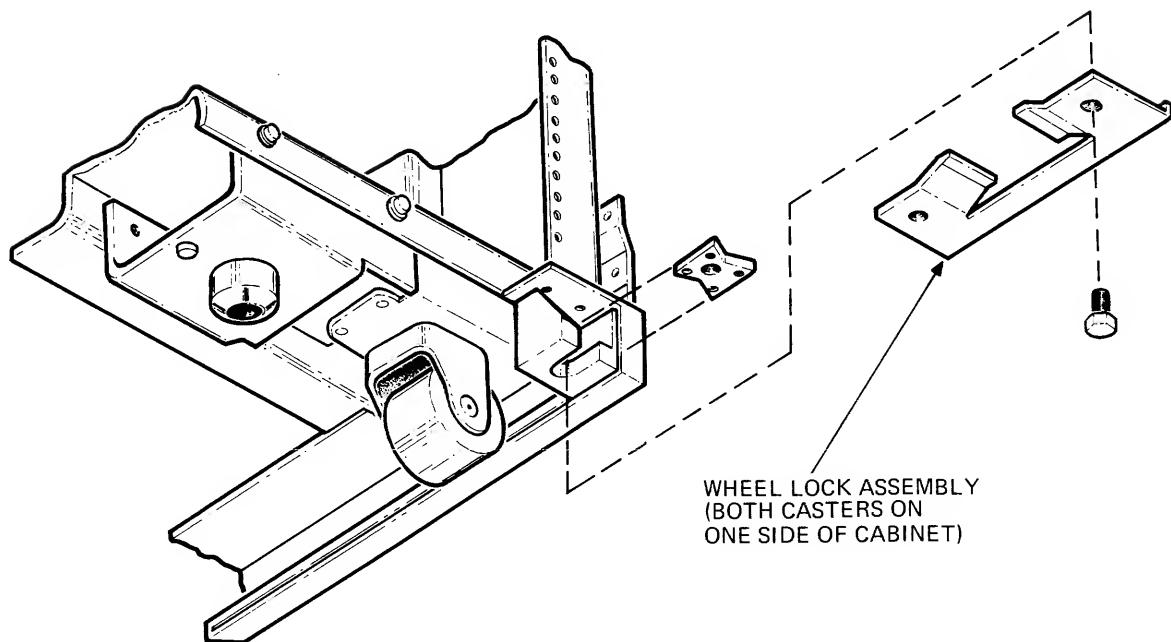
CUSTOMER NAME		REPORT NO.														
EQUIPMENT LOCATION (CITY AND STATE)		566861														
EMPLOYEE BADGE NO.	EMPLOYEE C.C.	UNIT	LOG NUMBER													
MACHINE C.C.	EXT.	PROD. LINE	ARE YOU ASSIGNED PERSON? (Y OR N)													
SYSTEM/PROCESSOR TYPE		VARIANT	IS CALL COMPLETE? (Y OR N)													
MFG PLANT		SYSTEM SERIAL NUMBER	SHIPPING PLANT													
DEC NUMBER (Installation Only)		VARIANT														
TRAVEL HOURS		REQUEST TIME	DAY REQUEST DATE	MONTH	YEAR	START TIME	DAY	START DATE	MONTH	YEAR	STOP TIME	DAY	STOP DATE	MONTH	YEAR	
LINE ITEM	ACTIVITY	REPAIR TIME	DEC OPTION	VARIANT	DEC OPTION SER. NO.	TYPE OF CALL	Action Taken	FAIL AREA - MODULE - FCO - COMMENTS						AUTHORIZED TESTS		INST. CODE
A																
B																
C																
D																
E																
TOTAL HOURS																
MATERIAL USED																
LINE ITEM	QTY.	CLASS	DEC PART NUMBER	BASIC	VARIANT	T	T	PART DESCRIPTION	VENDOR PART NO.	AMOUNT	LABOR	HOURS	\$			
										\$	@ \$	PER HOUR	\$			
										\$	@ \$	PER HOUR	\$			
										\$	TOTAL LABOR COSTS			\$		
										\$	TOTAL MATERIAL COST			\$		
										\$	TRAVEL COST			\$		
										\$				\$		
										\$				\$		
										\$	SUB TOTAL (ALL SHADED AREAS)			\$		
TO BE FILLED IN BY BILLING ONLY																
CUSTOMER (BILL TO ADDRESS)																
STREET		ATTENTION														
CITY		STATE		ZIP												
COST CENTER COPY																
CUSTOMER ACKNOWLEDGES RECEIVING THE MATERIALS AND SERVICES INDICATED ON THE FACE HEREOF AND UNDER THE TERMS AND CONDITIONS SET FORTH ON THE REVERSE SIDE								COST CENTER COPY								
AUTHORIZED CUSTOMER SIGNATURE				PRINT SIGNATURE NAME				CUSTOMER P.O. NO.				BRANCH APPROVAL				

Figure 1-1 LARS Report Form



TK-5986

Figure 1-2 Leveling Feet Adjustment



TK-7192

Figure 1-3 Wheel Lock Assembly

2. Open the CPU cabinet front and back doors using the keys in the "Open Me First" box. The key labeled DE-O opens the front door only; the key labeled DE-S opens the front and back doors.

**NOTE**

**Remove any installation hardware that is taped inside the CPU cabinet.**

3. Disconnect the ground strap from the back door, then lift the door off the hinge.
4. Release the top cover by reaching up to the under side of the front of the top cover and rotating the quarter turn fastener counterclockwise (Figure 1-4). Push the cover forward and lift it off. The released fastener should hang from the top cover by a wire.

**CAUTION**

**Do not apply power to system unless released fastener is first secured so it cannot short out the module beneath it.**

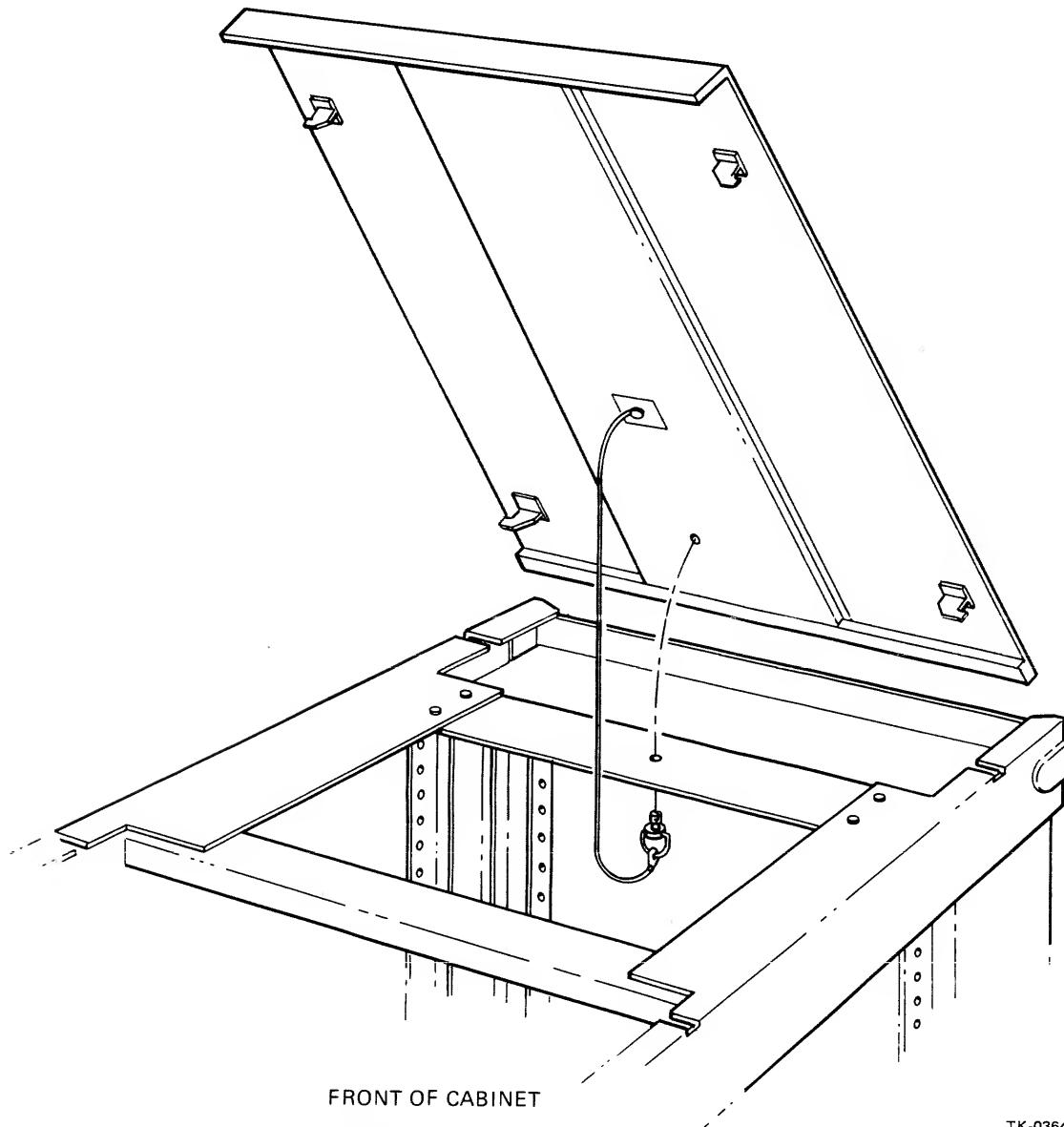
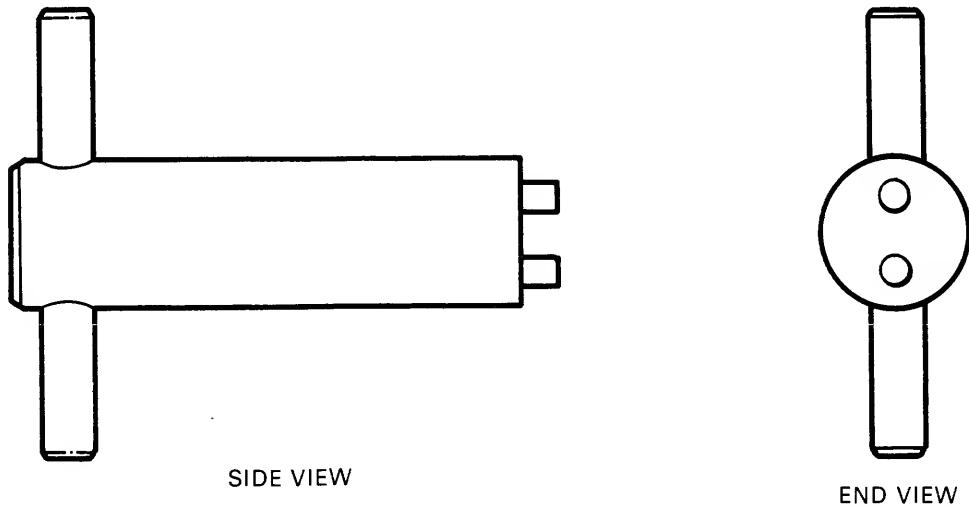


Figure 1-4 Top Cover Fastener

5. Remove the trim strips from the front and back right side of the CPU cabinet. The cabinet control panel must be removed before the right front filler strip can be removed. Remove the screws from each end of the panel and lay the panel carefully on top of the cabinet frame, keeping the wires intact.
6. Remove the red floppy disk drive shipping bracket.

### 1.2.2 UNIBUS Expander Cabinet Partial Disassembly

1. Using the opening tool (Figure 1-5), open the back door of the UNIBUS expander cabinet 90 degrees, then lift it off the hinges and remove it.
2. Disconnect the front door ground wire and remove the front door.
3. Remove the trim strips from the front and back right side of the CPU cabinet. The cabinet control panel must be removed before the right front filler strip can be removed. Remove the screws from each end of the panel and lay the panel carefully on top of the cabinet frame, keeping the wires intact.
4. Remove the two orange wheel lock assemblies (Figure 1-3).
5. Untape the stabilizer arms (Figure 1-6), and slide them forward while vertically lifting the interlock rod approximately one inch.
6. Install leveler pads in the stabilizer arms.
7. Raise the interlock rod and reinsert the stabilizer arms into the sleeve assemblies.
8. Remove the front, back, and top trim strips.



TK-0368

Figure 1-5 UNIBUS Expander Cabinet Opening Tool

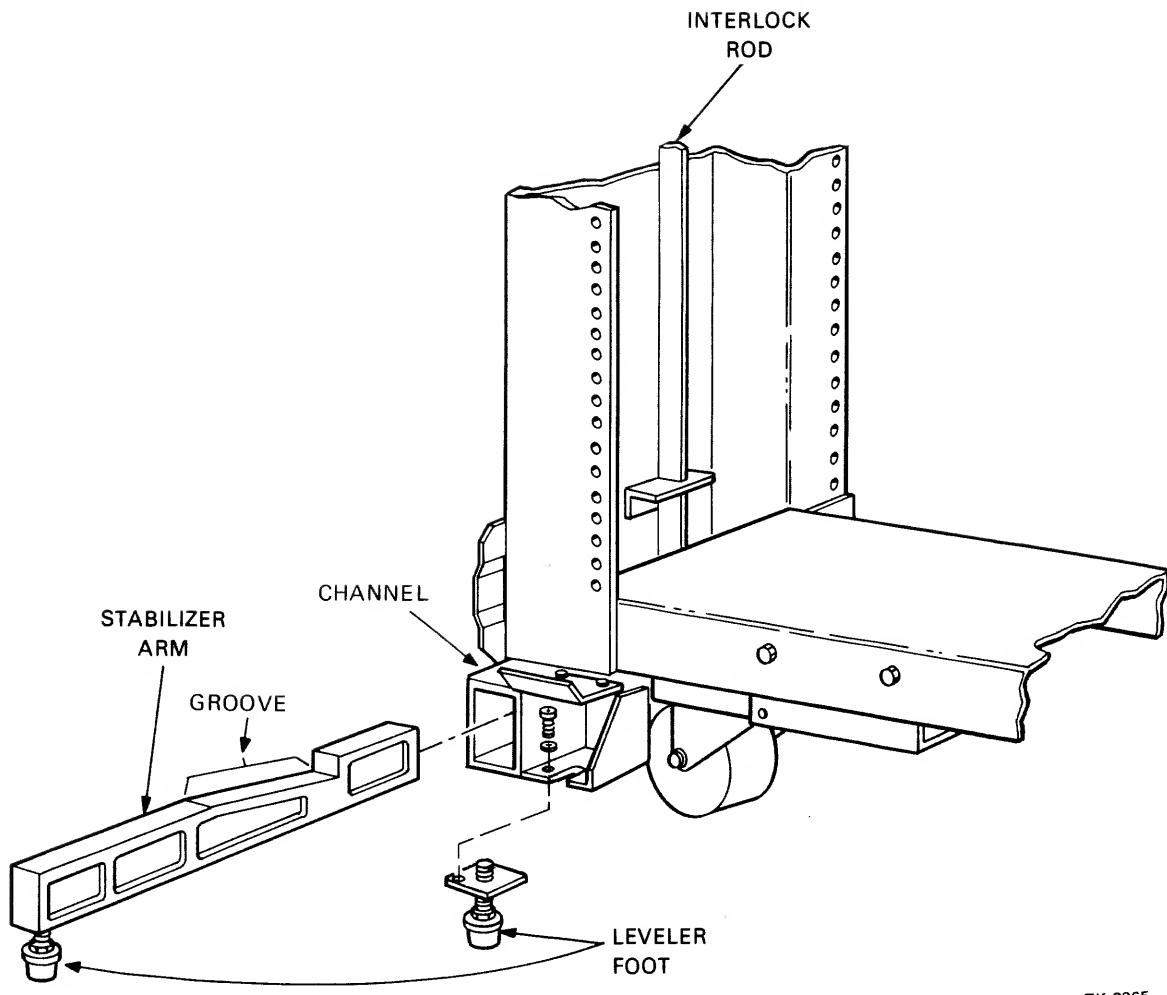


Figure 1-6 Stabilizer Arm and Leveling Pad

### 1.2.3 Tape Unit Cabinet Partial Disassembly

1. Remove the wheel lock assemblies from both casters at the left side of the cabinet until the corresponding bolt holes in the mounting plates at the top and bottom of each cabinet are aligned.
2. Remove the top of the cabinet.
3. Remove the back door.
4. Remove the bottom front panel using a thin-bladed tool (Figure 1-7).
5. Untape the stabilizer arms in the right and left end sleeve assemblies. Slide the arms forward out of the sleeves while lifting the interlock rod approximately one inch to free the left side interlock from the sleeve.
6. Screw a leveler pad into each stabilizer arm.

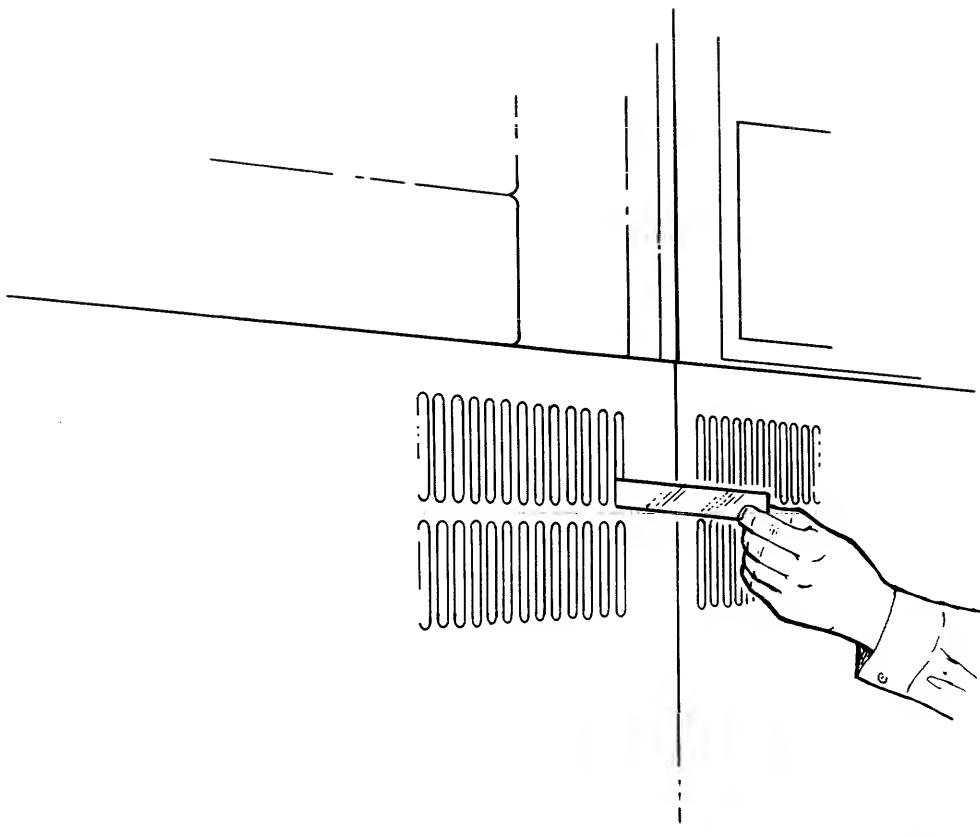


Figure 1-7 TE16 Cabinet/UNIBUS Expander Cabinet  
Front Panel Removal

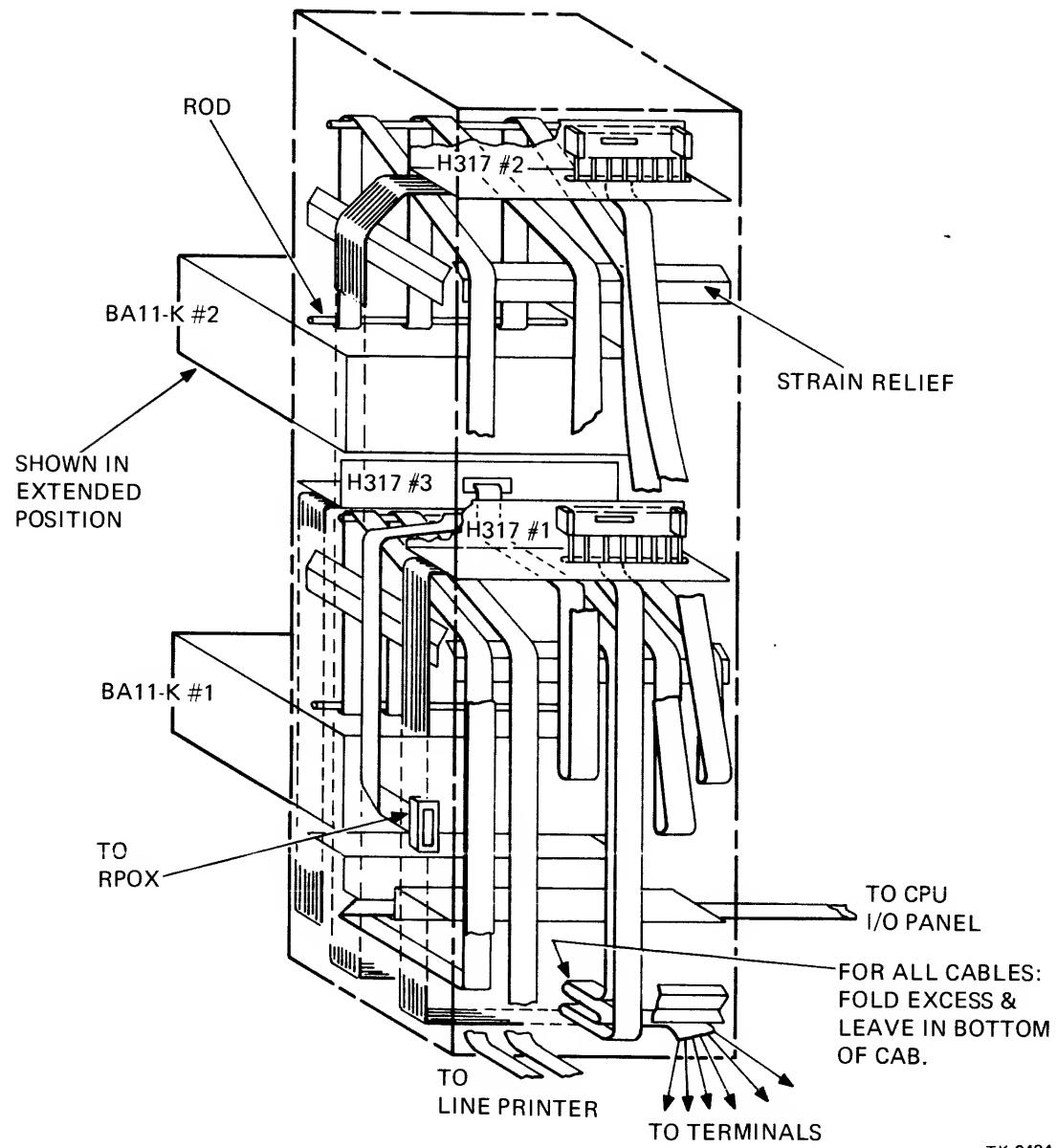
7. Raise the interlock rod and reinsert the stabilizer arms into the sleeve assemblies.
8. Perform the preceding seven steps for each additional tape unit.

### 1.3 INTERCABINET CABLING AND INSTALLATION OF PERIPHERAL DEVICES

1. Loosen the thumb screws and then remove the exhaust plenum from the back of the system cabinet.
2. The three-wire DIGITAL power control bus cable is shipped with tie wraps holding it to the front of the UNIBUS expander cabinet. Connect it from the I/O panel J8 connector at the right end of the system cabinet to the 861 connector in the UNIBUS expander cabinet. This connects the 866/869 power controller in the main cabinet with the 861 power controller in the expander cabinet.
3. Connect the remote power sense cable between all 861 power controllers.
4. Plug the three UNIBUS ribbon cables (P2, P1, P3) from the BA11-K box in the UNIBUS expander cabinet, into the corresponding receptacles (J3,J2,J1) in the CPU cabinet (Figure 1-8).

NOTE:  
EXAMPLE CABLE ROUTING  
FOR FULL CONFIGURATION.  
DUPLICATE  
CABLING NOT SHOWN.

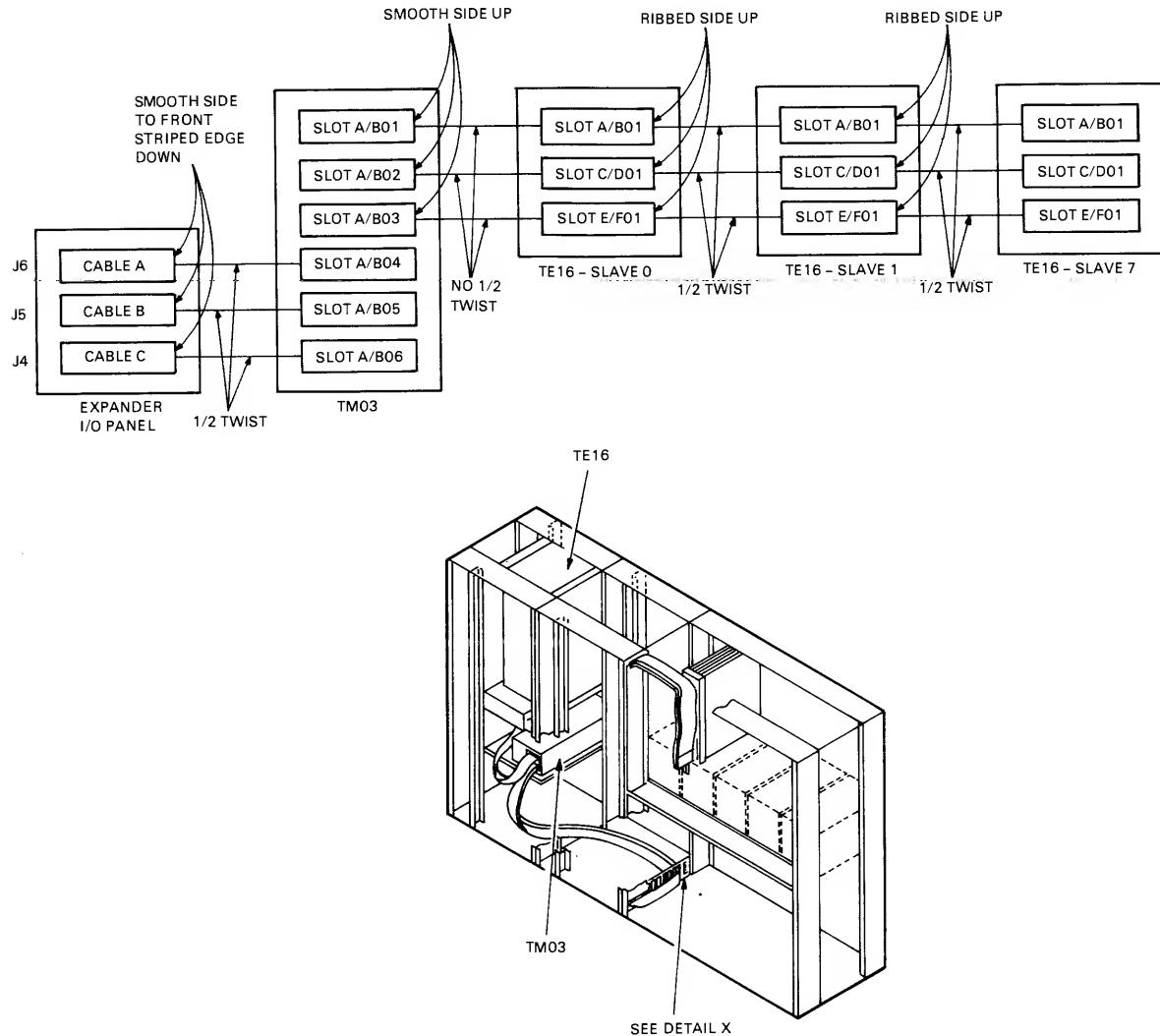
NOTE: CABLES ARE TO BE CENTERED  
BEHIND BA11-K BOXES WHEN  
PASSING BEHIND THEM. CABLES  
SHOWN SPREAD-OUT FOR  
DRAWING CLARITY ONLY.



TK-0484

Figure 1-8 UNIBUS Expander Cabinet Cabling

5. If a tape drive is present, connect the I/O cables from the TM03 formatter (Figure 1-9) to J4, J5, J6 of the I/O panel in the system cabinet. Daisy chain the DIGITAL power control bus cable to the 861 power controller. If two or more tape drives are present, daisy chain the I/O cables. Eight TE16 tape drives can be connected to one TM03 formatter.



RH780 TO EXPANDER I/O PANEL				EXPANDER I/O PANEL TO TM03			
PART NO	DESCRIPTION	FROM	TO	FROM	TO	DESCRIPTION	PART NO
BC06R-10	I/O CABLE	M9041-A	EXP I/O CONN J6	EXP I/O CONN J6	TM03 A/B04	I/O CABLE	BC06R-20
BC06R-10	I/O CABLE	M9041-B	EXP I/O CONN J5	EXP I/O CONN J5	TM03 A/B05	I/O CABLE	BC06R-20
BC06R-10	I/O CABLE	M9041-C	EXP I/O CONN J4	EXP I/O CONN J4	TM03 A/B06	I/O CABLE	BC06R-20

TK-0264

Figure 1-9 TE16 Cable Connections

6. If an RK06 or RK07 disk drive is present, unpack the unit and attach the I/O cables to the RK611 or RK711 controller in the BA11-K box according to the installation instructions in the manual shipped with RK06/RK07. Route the cables in the UNIBUS expander cabinet according to the drawing in the UNIBUS print set.
7. Connect the ground cable between the RK06 and the frame of the UNIBUS expander cabinet.
8. If RP05, RP06, RM03, RM05, or RM80 disk drives are present, unpack them and set them up according to procedures outlined in the appropriate installation manuals.
9. Connect the RP05, RP06, or RM03 MASSBUS cable to the I/O panel J3 in the system cabinet (Figures 1-10 and 1-11).

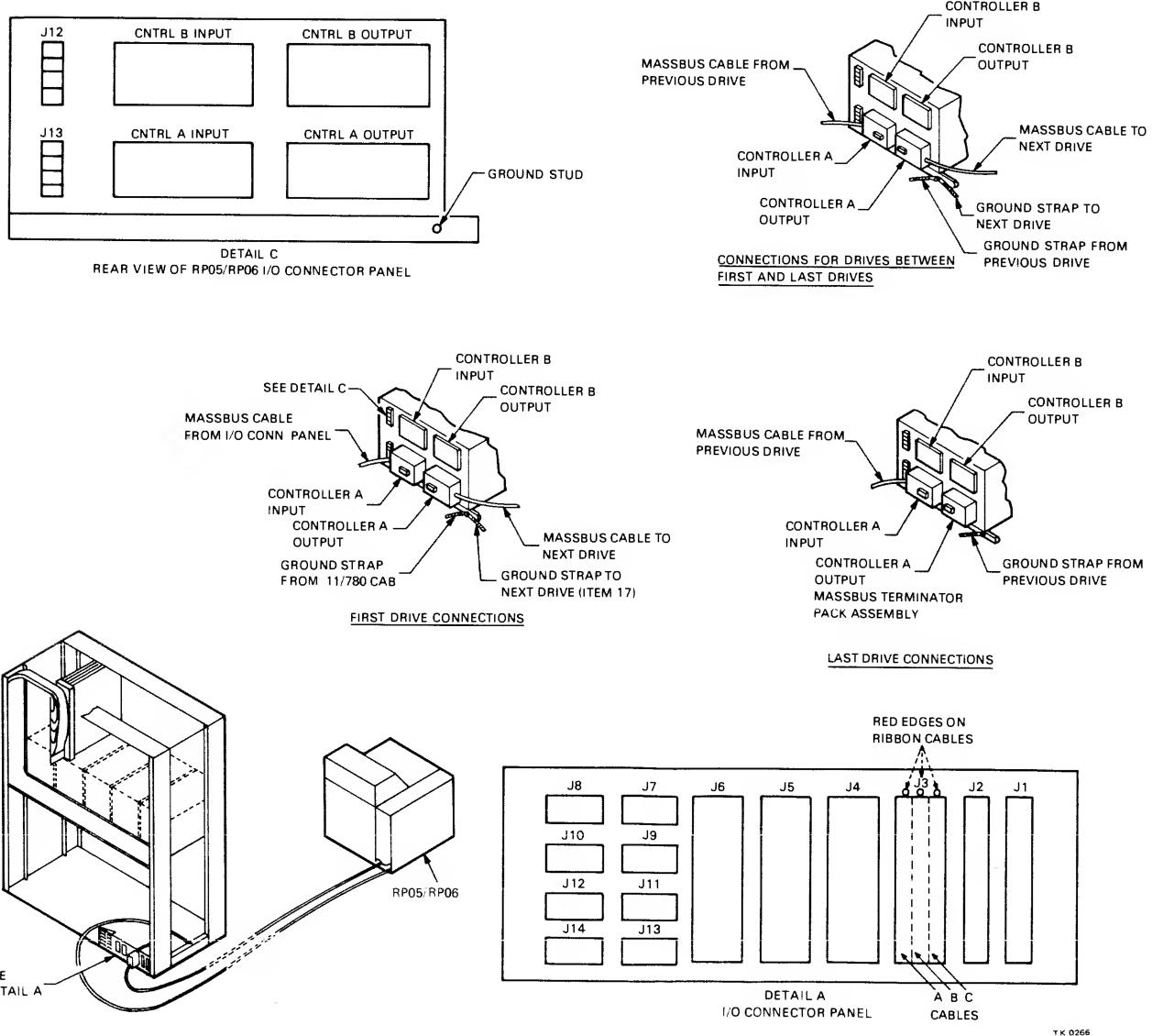
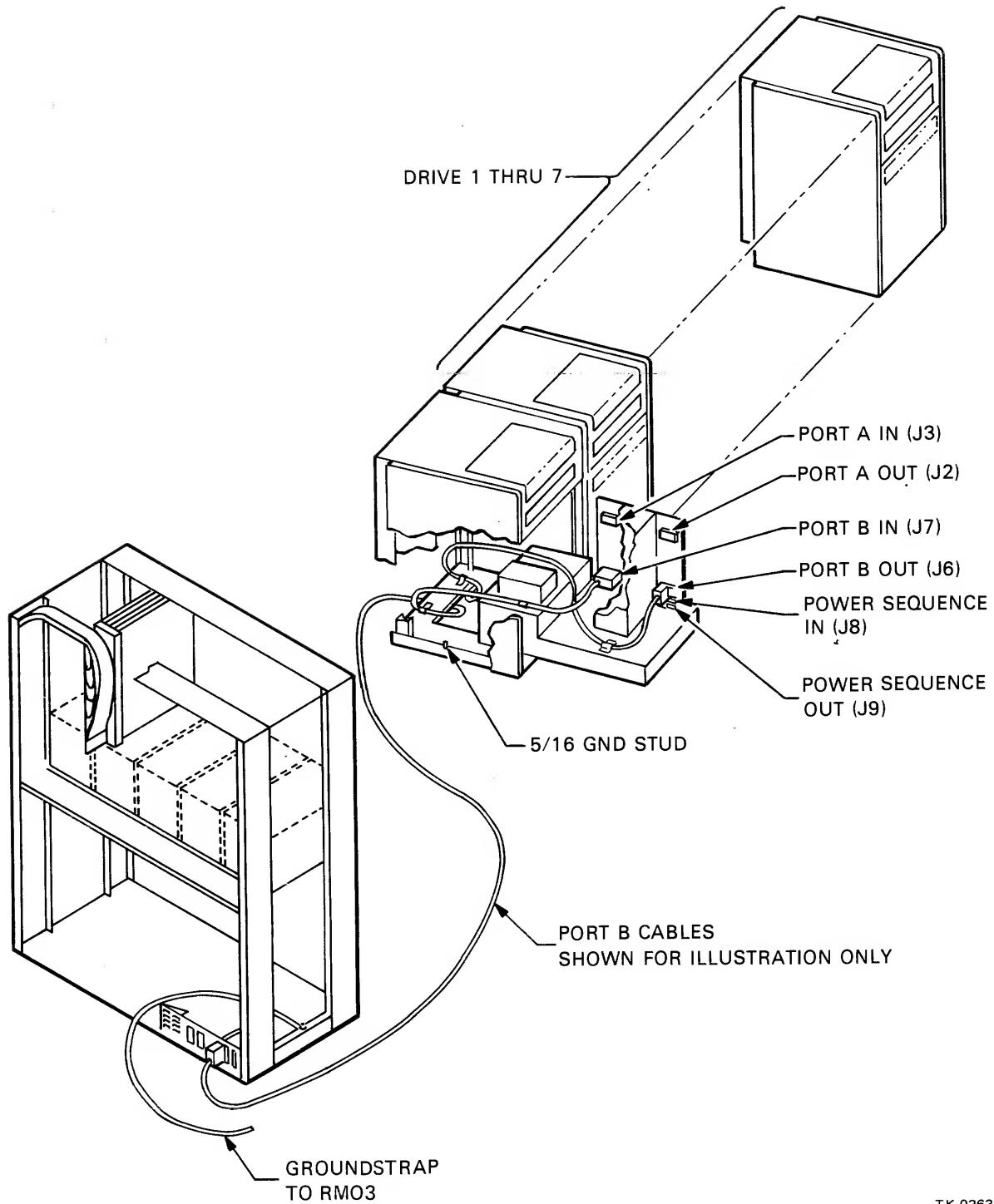


Figure 1-10 RP05/RP06 Cable Connections



TK-0263

Figure 1-11 RM03 Cable Connections

10. Connect the ground wire between the RP05, RP06, or RM03 disk drive and the frame of the system cabinet.
11. If a line printer is present, unpack it and set it up according to the instructions listed in the *LP11/LS11/LA11 Line Printer Manual* (EK-LP11-TM-006).
12. Connect the line printer cable (70-11 212-0-0) from the BA11-K box to the line printer. The cable is round and black or gray.
13. Connect the I/O cables from the supplied terminals to the H317 distribution box in the UNIBUS expander cabinet, as explained in the *DZ11 User's Guide* (EK-DZ110-OP-PRE).
14. If a card reader is present, unpack it and set it up according to the instructions listed in the *CR11/CM11 Card Reader System Installation Manual* (EK-OCR11-TM-004). The I/O cable (70-08738) is round and black.
15. Remove the shipping clamps from the BA11-K box in the UNIBUS expander cabinet. If the BA11-K blocks access to the trim strip mounting holes, pull the stabilizer arms out and slide out the BA11-K box before mounting the trim strips.
16. Replace the top cover of each cabinet.
17. Connect the ground straps between cabinets.

#### 1.4 JOINING CABINETS

1. Study the customer floor plan then push the cabinets to adjacent positions. They should be arranged from left to right as follows: system cabinet (left most), synchronous backplane interconnect (SBI) expander cabinet (if present), UNIBUS expander cabinet and tape unit cabinet(s) (right most, if present).
2. Insert the leveler feet into the brackets at the four corners of each cabinet.
3. Lower the cabinet feet with a 9/16-inch wrench until all feet touch the floor.
4. Adjust the system cabinet height until most of the cabinet weight rests on the feet. Use a spirit level to bring the cabinet horizontal.

**NOTE**

**If the CPU cabinet is not level, the front door does not align.**

5. Adjust the height, and front and back position of the adjoining cabinet to align the corresponding bolt holes in the mounting plates at the top and bottom of each cabinet.
6. Insert a 1/4-20 bolt into each hole in the bolting plates (Figure 1-12). Add the nuts and tighten them.
7. Perform steps 5 and 6 for each remaining cabinet.
8. Lower the stabilizer arm pads to the floor. The stabilizer arms should still be free enough to slide.
9. Reinstall the top, front and back trim strips between the cabinets (four screws each).
10. Replace the top cover of each cabinet.

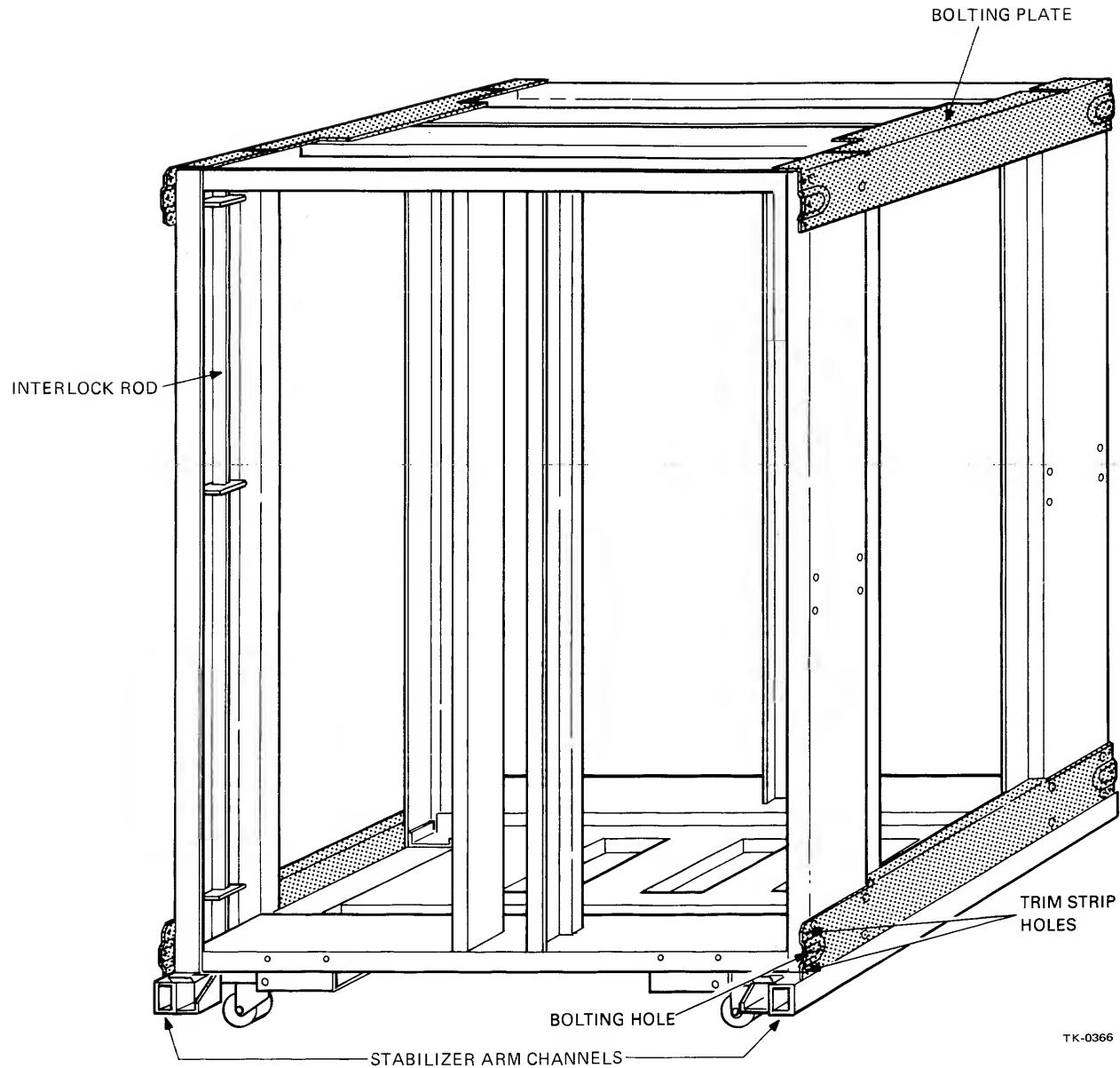


Figure 1-12 Cabinet Framework Details

11. Connect the ground straps between cabinets.

## 1.5 CONSOLE INSTALLATION

1. Remove packing material (Figure 1-13).
2. Remove the poly bag from the printer.
3. Remove the foam key protector pad from the keyboard.
4. Loosen and remove the hex-head bolt securing the wooden leg brace to the skid assembly. Remove the microfoam from each leg of the LA120.

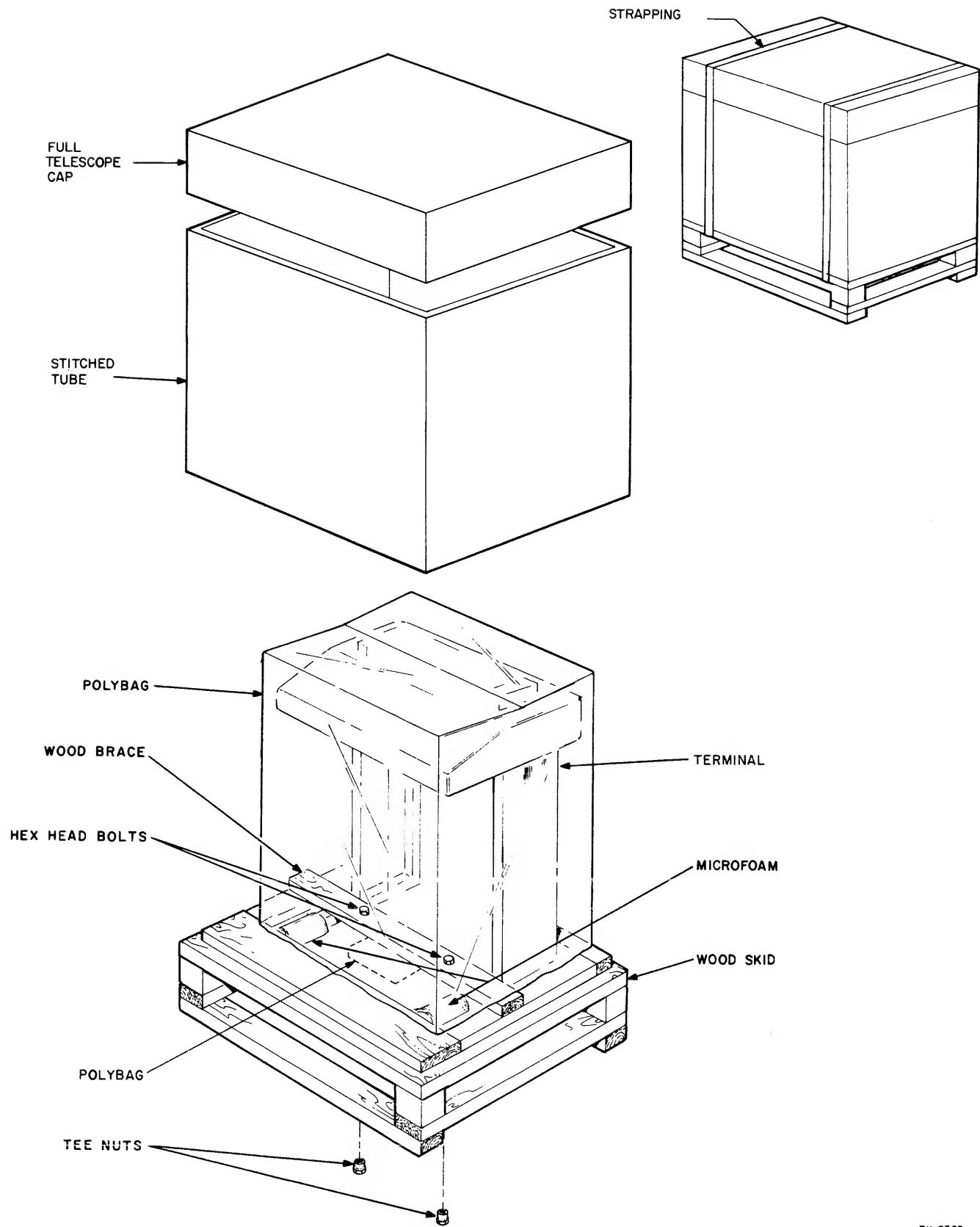


Figure 1-13 Console Packaging

5. Carefully inspect the cabinet, keyboard, and carriage assembly for any shipping damage. Check the enclosed packing list for missing items and report any damage or missing items.
6. Lift the top cover assembly; clip and remove the nylon cable tie holding the print head assembly. Remove the caution tag.
7. Install and adjust the leg leveling feet.
8. Connect the power cable to an UNSWITCHED outlet on the 869 power controller.
9. Plug the I/O cable into J7 of the I/O connector panel at the lower back of the CPU cabinet.
10. Connect the console primary power cable to the customer ac power outlet.

### 1.6 POWER CHECK

The system cabinet, the SBI expander cabinet and the RP05/RP06 disk drives need three-phase ac power. The UNIBUS expander cabinet and remaining peripheral devices require single-phase ac power.

The ac power receptacles must meet the specifications listed in Table 1-1. Figure 1-14 shows the receptacles and plugs. When checking the three-phase sources, measure the voltage between each of the three phases and neutral on the receptacles. When checking the single-phase sources, measure the voltage between the source and neutral lines on the receptacles.

**Table 1-1 AC Power Requirements**

<b>Three-Phase</b>	<b>Nominal</b>	<b>Minimum</b>	<b>Maximum</b>
Vac	120	100	127
Hz	50	49	61
Hz	60	59	61
Current in amps			20
Vac	240	200	254
Hz	50	49	51
Hz	60	59	61
Current in amps			10
<b>Single-Phase (for UNIBUS expander cabinet)</b>			
Vac	120	90	132
Hz	50	47	63
Hz	60	47	63
Current in amps	12		20
Vac	240	180	264
Hz	50	47	63
Hz	60	47	63
Current in amps	7		10

SOURCE	PLUG	RECEPTACLE	USED ON
120V 15A 1-PHASE			ALL 120 V TABLE-TOP COMPUTERS. STANDARD 120V LOW-CURRENT DISTRIBUTION. 120V TU10 UNITS. MOST 120V TERMINAL DEVICES.
120V 30A 1-PHASE			ALL 120V STANDARD CABINET MOUNTED EOPT
120/208V-240V 20A 2-PHASE or 120/208V 20A 3-PHASE Y			120V PDP-11/46 PROCESSOR CABINET ONLY.
120/208V 20A 3-PHASE Y			60 Hz RM 10 DRUM 60 Hz RP02/RP03/ RP04, RP05, RP06
240V 15A 1-PHASE			ALL 240V TABLE-TOP COMPUTERS. STANDARD LOW-CURRENT 240V DISTRIBUTION. MOST 240V TERMINAL DEVICES. 240V TU10.
240V 20A 1-PHASE			ALL 240V STANDARD CA8INET MOUNTED EQUIPMENT.
240/416V 20A 3-PHASE Y			60 Hz RM10 DRUM 60 Hz RP02/RP03/ RP04
120/208V 30A 3-PHASE Y			PDP11/70 PROCESSOR PDP 11/70 MEM. VAX-11/780 PROCESSOR

TK-0363

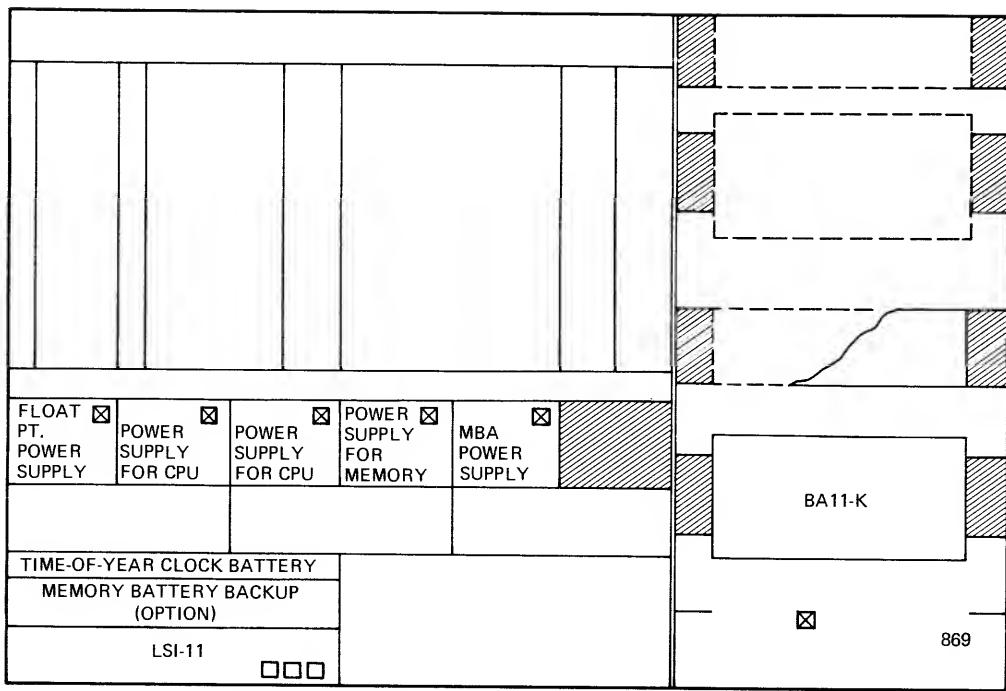
Figure 1-14 Power Plugs and Receptacles

## CHAPTER 2

### CHECKOUT AND ACCEPTANCE PROCEDURE

#### 2.1 SYSTEM TURN-ON

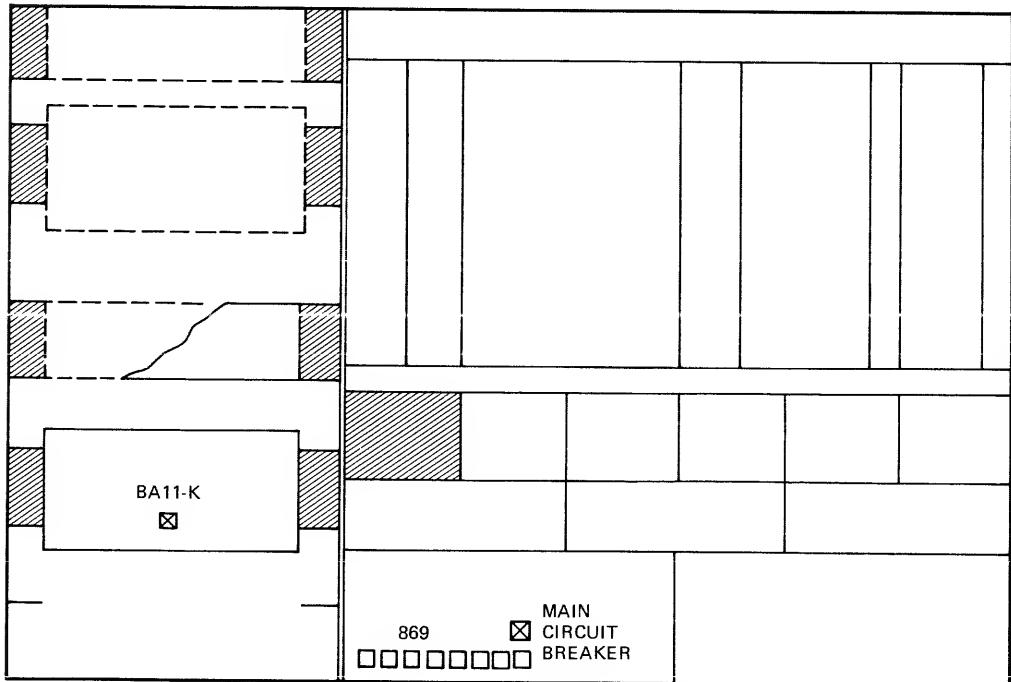
1. Make sure that all circuit breakers (Figure 2-1) in the system, including those in the system power supplies, are OFF.
2. Make sure that all power control sense switches are in the REMOTE position.
3. Make sure that the AUTO RESTART switch on the control panel (top front of system cabinet) is in the OFF position.
4. Connect the power cable for the system cabinet to the customer power source. Connect the power cable for the UNIBUS expander cabinet to the customer power source. Connect the power cable for the console terminal and the other free-standing peripheral devices to the customer power source. Note that the system cabinet (and the SBI expander cabinet) and the RPO5/RP06 disk drive require three-phase ac power. The UNIBUS expander cabinet and the remaining peripheral devices require single-phase ac power.
5. Set the main circuit breaker on the power control module to ON.
6. Make sure the memory blower (the middle blower) is turned ON.
7. Set the three secondary circuit breakers on the 866/869 power control module to ON.
8. Open both front system cabinet doors if they are not already open.
9. Make sure the memory power supply POWER NORMAL indicator lamp is lit.
10. Make sure all remaining circuit breakers (including the following) are in the ON position.
  - H7111 battery backup circuit breakers
  - H7112 battery backup circuit breakers (if present)
  - 869 circuit breakers in the CPU cabinet and the CPU expander cabinet
  - 861 circuit breakers in the UNIBUS expander cabinet, the TEE16 cabinet, and the TE16 cabinet
  - All circuit breakers on free-standing peripheral devices



VAX-11/780 SYSTEM CABINET

UNIBUS EXPANSION CABINET

FRONT VIEW



UNIBUS EXPANSION CABINET

VAX-11/780 SYSTEM CABINET

REAR VIEW

TK-7190

Figure 2-1 Circuit Breaker Locations

11. Make sure the POWER NORMAL indicators on each power supply are lit and no fault indicator is on.
12. Release the drive lock and pull out the diskette drive assembly.
13. Press the diskette slot cover lock and slide the cover to the right.
14. Insert the console diskette ZZ-ESZAB (label to the right) into the RX01 diskette drive and close the cover.
15. Make sure the console terminal power is ON. The LSI-11 HALT ENABLE switch should be set to ENABLE (up), the LSI-11 power switch set to ON (up) and the LTC switch set to OFF (down).
16. Set the five-position key switch on the control panel to the LOCAL position.
17. Make sure all blowers are functioning.
18. The power-up restart message should be printed on the console terminal.

**Console terminal output:**

```
CPU HALTED, SOMM CLEAR, STEP=NONE, CLOCK=NORM
RAD=HEX, ADD=PHYS, DAT=LONG, FILL=00, REL=00000000
INIT SEQ DONE
HALTED AT 00000000

(RELOADING WCS)
LOAD DONE, 00003200 BYTES LOADED
VER: PCS=01 WCS=03-10 FLPA=03 CON=PX03-08
```

19. Set all remaining circuit breakers on power controllers, expander boxes, and peripherals to ON.

## **2.2 SYSTEM CHECK-OUT**

To completely test the system, run the diskettes listed in Table 2-1.

**Table 2-1 Basic VAX-11/780 Diskette Directory**

<b>RX Number</b>	<b>Diagnostic</b>	<b>Title</b>	<b>Part Number</b>
RX#2		11780 MICRODIAG #1	AS-E158M-DE
RX#3		11780 MICRODIAG #2	AS-E159M-DE
RX#8		VAX 11 INSTR #1	AS-E161N-DF
	ESSAA.EXE EVKAA.EXE EVKAB.EXE EVKAB.HLP EVSAE.HLP	DIAG. SUPERVISOR VAX 11 HARDCORE INSTR. VAX 11 ARCHITECTURAL INSTR. HELP FILE FOR AVKAB.EXE SUPERVISOR HELP FILE	
RX#25		VAX 11 INSTR #2	AS-F748H-DE
	EVKAC.EXE EVKAC.HLP EVKAD.EXE EVKAE.EXE EVKAE.HLP	FLOATING POINT INSTR. HELP FILE FOR EVKAC.EXE COMPATIBILITY MODE INSTR. PRIVILEGED ARCHT INSTR. HELP FILE FOR EVKAE.EXE	
RX#7		11780 CHANNEL DIAG	AS-E160P-DE
	ESCAA.EXE ESCBA.EXE EVSAE.HLP	MASSBUS CHANNEL ADAPTER DIAG. UNIBUS CHANNEL ADAPTER DIAG. SUPERVISOR HELP FILE	

**PART II**  
**Options**

## CHAPTER 3

### UNPACKING AND INSPECTION

#### 3.1 UNPACKING

1. Make sure the shipping container is sealed and undamaged and that the correct number of containers was shipped. Report any differences to the customer and also on a LARS report form (Figure 1-1).

**NOTE**

**If any items are missing the customer should check with the carrier.**

2. Open the containers one at a time, starting with the one marked "Open Me First". Inventory the contents via the packing slip and record any missing items on the installation report.

**NOTE**

**Packing materials (e.g. foam fillers, plastic inserts) should be retained if reshipment is contemplated.**

#### 3.2 OPTIONS INSPECTION

Inspect for and report any damage to the customer; record it on the installation report. Any damaged components requiring replacement immediately should be reported to the branch service manager.

## CHAPTER 4

# FLOATING-POINT ACCELERATOR

### 4.1 GENERAL

The FP780-AA/AB is a high performance floating-point accelerator for single- and double-precision floating-point instructions plus POLY, EMOD, and MULL.

The FP780-A installation kit consists of:

- Five extended hex modules
- H7100 power supply
- Interconnecting power supply cables
- FP780-A decal

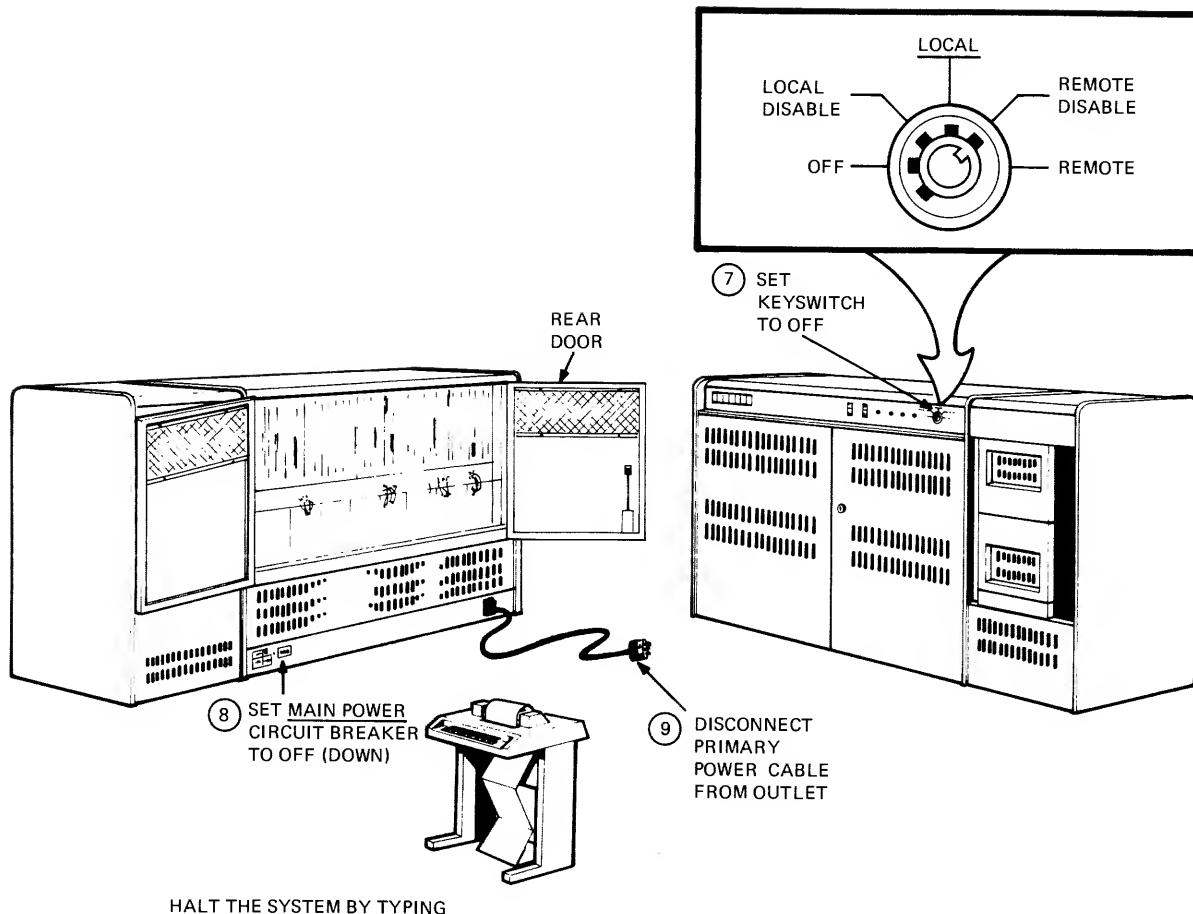
### 4.2 FP780 INSTALLATION

1. Turn off the system via the steps listed in Figure 4-1.
2. Install the FP780 via the steps shown in Figure 4-2.
3. Turn on the system (Figure 4-3) and perform FP780 diagnostics.

### 4.3 FP780 DIAGNOSTICS

Load the following diskettes and perform one run with each.

1. ESKAH
2. ESKAJ
3. EVKAC
4. UETP



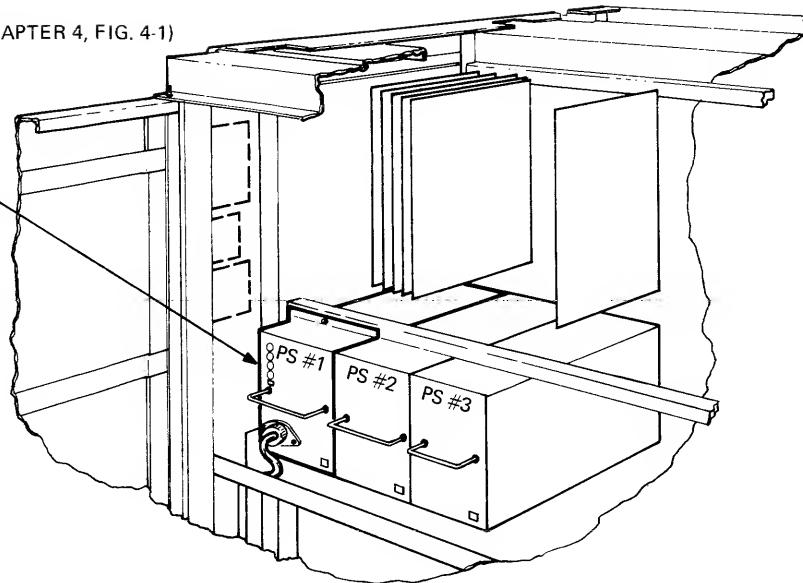
HALT THE SYSTEM BY TYPING

1. "SYSTEM" AFTER THE "USERNAME" PROMPT
2. "MANAGER" AFTER THE "PASSWORD" PROMPT
3. "@SYS\$SYSTEM:SHUTDOWN" AFTER THE DOLLAR SIGN "\$" PROMPT
4. "0" AFTER THE QUESTION "HOW MANY MINUTES UNTIL SHUTDOWN?"
5. "MAINT" AFTER THE "REASON?" QUESTION
6. "NO" AFTER THE "DO YOU WANT TO SPIN DOWN THE DISKS?" QUESTION

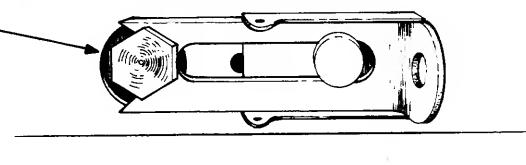
TK-7194

Figure 4-1 System Turn-Off Procedure

- ① TURN OFF SYSTEM POWER (CHAPTER 4, FIG. 4-1)
- ② REMOVE BLANK POWER SUPPLY PANEL FROM WHERE POWER SUPPLY NO. 1 WILL BE INSTALLED AND THEN INSTALL POWER SUPPLY NO. 1

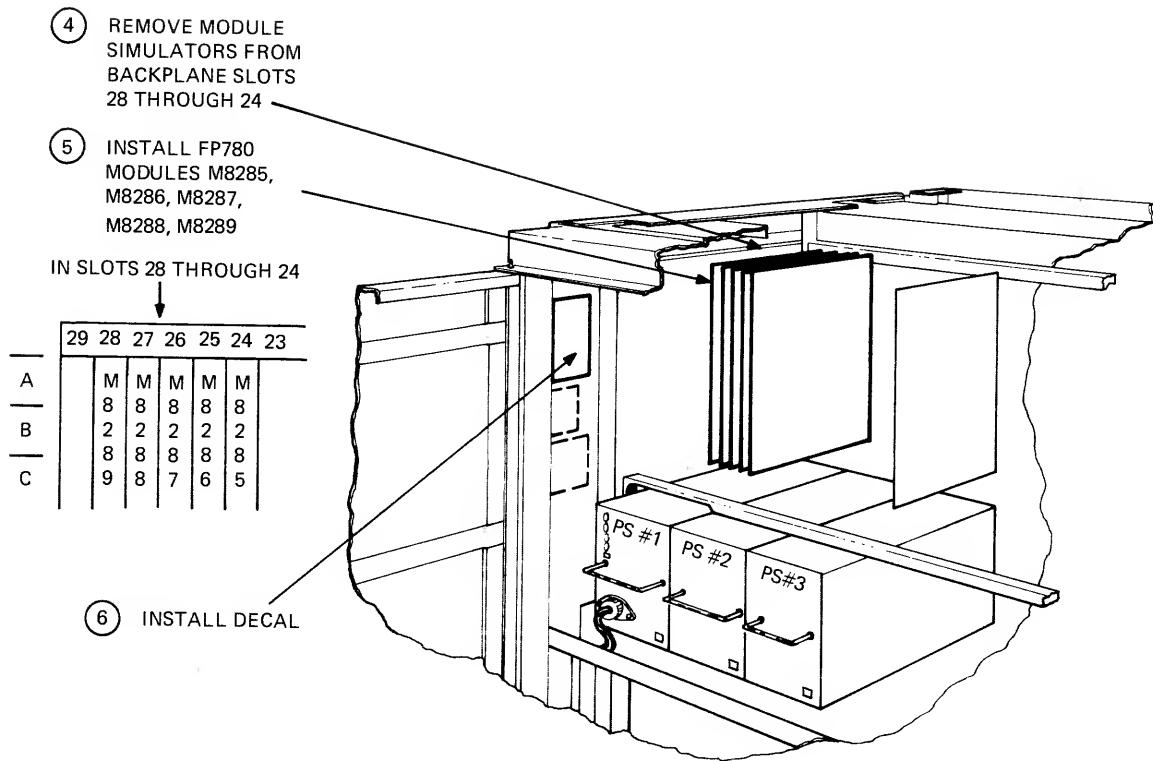


- ③ AT REAR OF POWER SUPPLY NO. 1 ENGAGE STUD WITH SLIDE LOCK ASSEMBLY



TK-7214

Figure 4-2 FP780 Installation (Sheet 1 of 4)



TK-7189

Figure 4-2 FP780 Installation (Sheet 2 of 4)

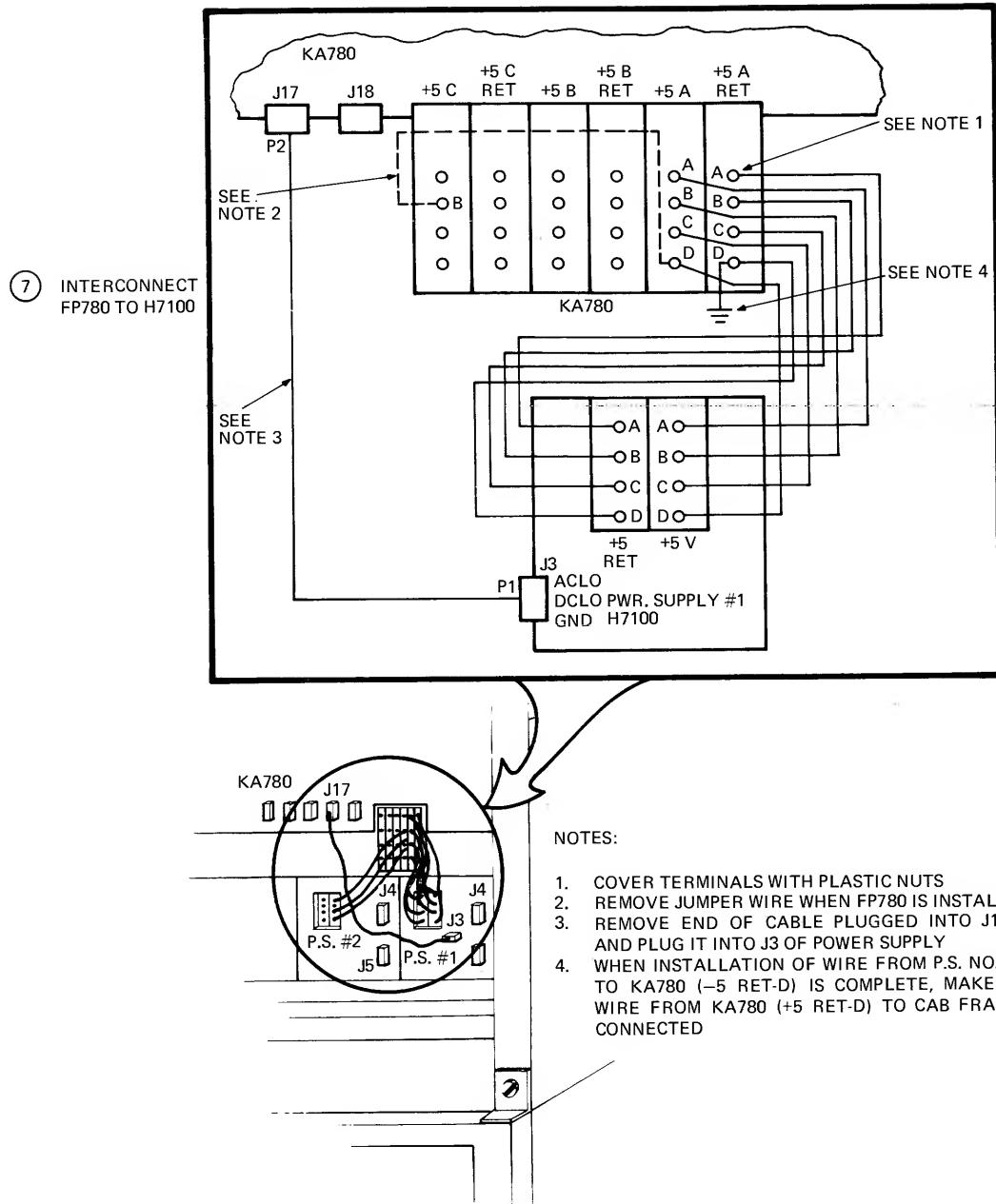
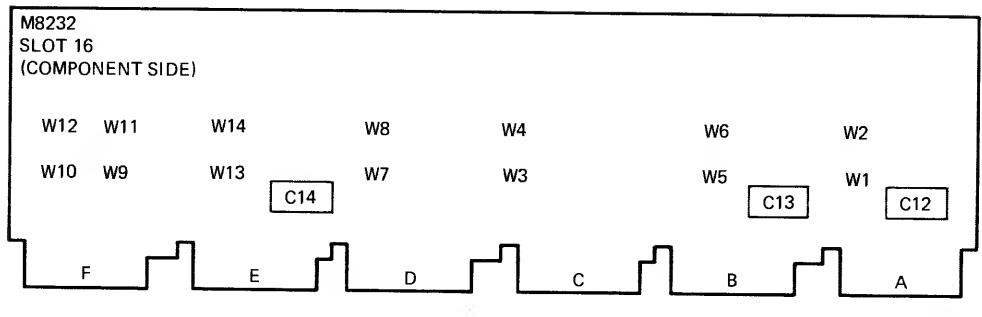


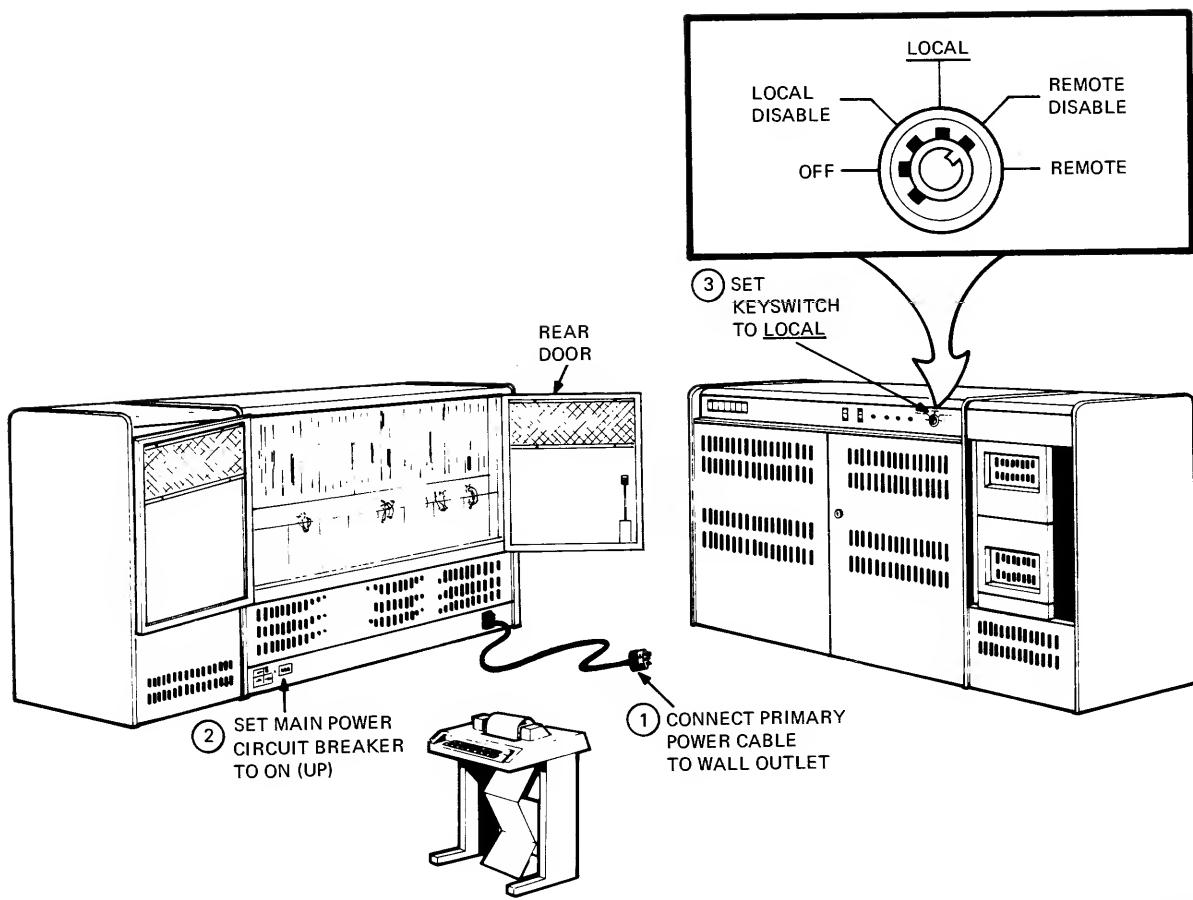
Figure 4-2 FP780 Installation (Sheet 3 of 4)

- ⑧ TORQUE GROUND AND +5 V WIRES ON POWER SUPPLY TO 30 IN POUNDS
- ⑨ CONNECT POWER SUPPLY NO. 1 AC POWER CABLE TO J1, J3, J4 OR J5 OF 869 POWER CONTROLLER
- ⑩ REMOVE M8232 AND THEN INSTALL AND SOLDER JUMPERS FROM:  
W1 TO W2  
W5 TO W6  
W3 TO W4  
W7 TO W8  
W13 TO W14  
W9 TO W11  
W10 TO W12



- ⑪ REINSTALL M8232 IN BACKPLANE SLOT 16

Figure 4-2 FP780 Installation (Sheet 4 of 4)



TK-7195

Figure 4-3 System Turn-On Procedure

## CHAPTER 5

### UNIBUS ADAPTER

#### 5.1 GENERAL

The VAX-11/780 UNIBUS adapter (UBA) DW780-AA/AB interfaces the CPU to the system units in the BA11-K expansion boxes. There can be a maximum of four UBAs (DW780s) installed in the VAX-11/780.

The DW780-CC/DD installation kit consists of:

- DW780-AA/AB card cage and backplane assembly
- H7100 power supply
- Blank SBI slot panel
- Interconnecting cables
- Expansion cabinet DW780-AA/AB decal

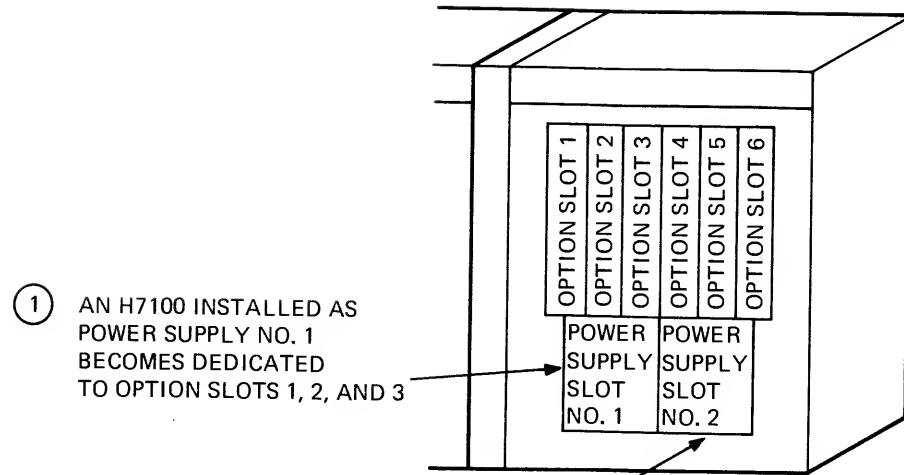
#### 5.2 DW780 POWER SUPPLY INSTALLATION

##### 5.2.1 System Turn-Off

Turn off the system (Figure 4-1).

##### 5.2.2 H7100 Installation

Determine the need for the H7100 included in the option installation kit (Figure 5-1). If an H7100 is not required inform the customer of H7100 spare status and then proceed with the option installation procedure. If an H7100 is required remove the blank power supply panel. Install the H7100, using the mounting hardware and the slide lock (Figure 5-2).

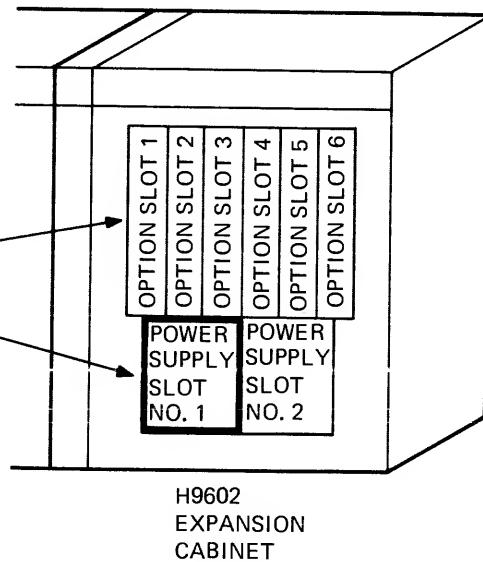


① AN H7100 INSTALLED AS POWER SUPPLY NO. 1 BECOMES DEDICATED TO OPTION SLOTS 1, 2, AND 3

② AN H7100 INSTALLED AS POWER SUPPLY NO. 2 BECOMES DEDICATED TO OPTION SLOTS 3, 4, AND 5

H9602  
EXPANSION  
CABINET

③ IF SLOT 1 IS AVAILABLE FOR OPTION INSTALLATION AN H7100 MUST BE INSTALLED AS POWER SUPPLY NO. 1



H9602  
EXPANSION  
CABINET

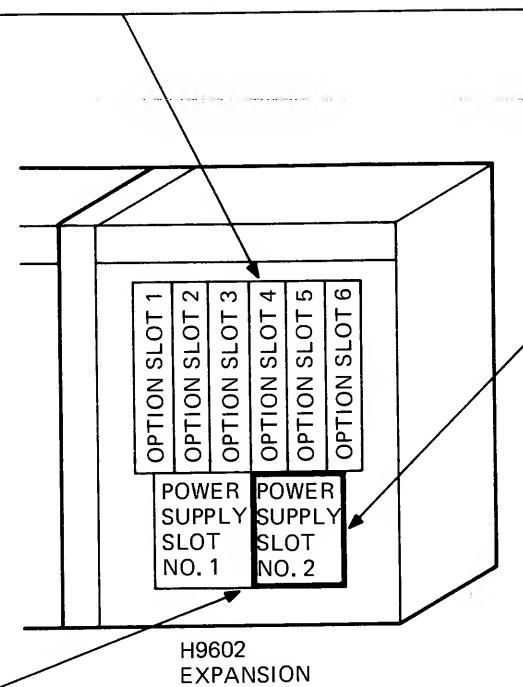
TK-7197

Figure 5-1 Power Supply Utilization (Sheet 1 of 2)

④ IF AN H7100 HAD BEEN PREVIOUSLY INSTALLED AS POWER SUPPLY NO. 1 FOR AN OPTION MOUNTED IN SLOT 1 (AND SLOTS 2 OR 3 ARE AVAILABLE FOR THE OPTION) THE H7100 IN THE OPTION INSTALLATION KIT IS NOT REQUIRED

⑤ IF SLOT 4 IS AVAILABLE FOR OPTION INSTALLATION AN H7100 MUST BE INSTALLED (AS POWER SUPPLY NO. 2)

⑥ IF POWER SUPPLY NO. 2 HAD ALREADY BEEN PREVIOUSLY INSTALLED FOR AN OPTION IN SLOT 4 (OPTION WILL THEN BE MOUNTED IN SLOT 5) THE H7100 IN THE OPTION INSTALLATION KIT IS NOT REQUIRED



TK-7201

Figure 5-1 Power Supply Utilization (Sheet 2 of 2)

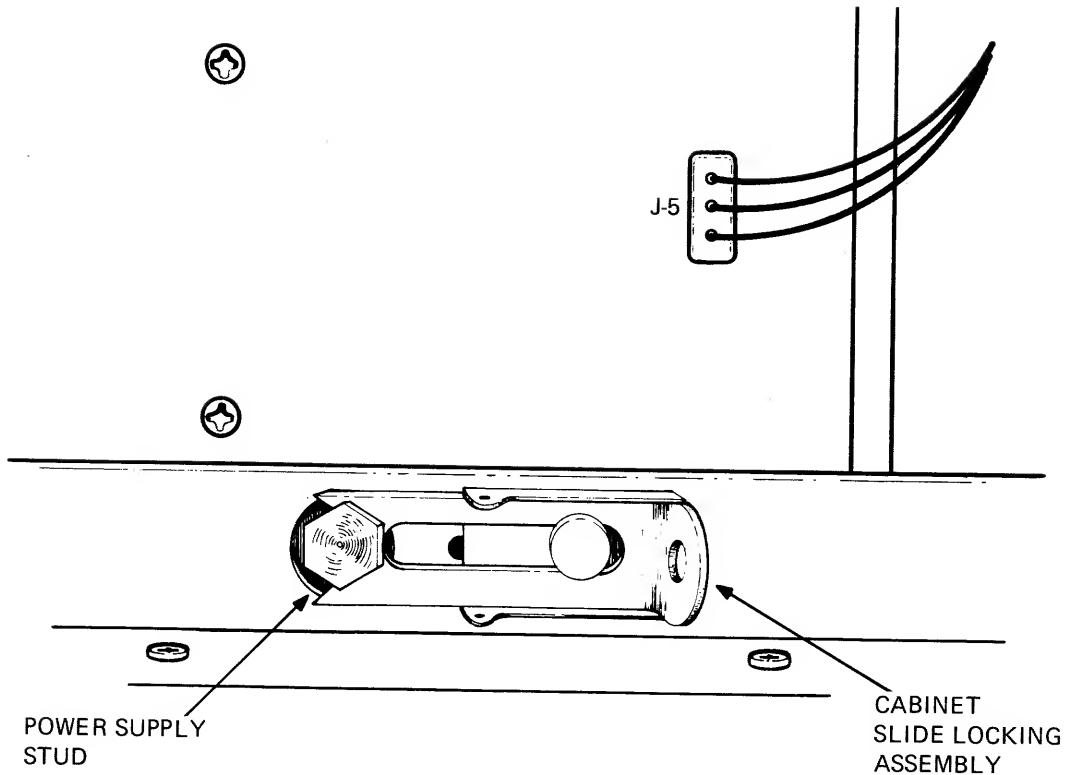


Figure 5-2 Power Supply Slidelock Details

## 5.3 SYSTEM FAR END TERMINATOR

### 5.3.1 SFT Removal

1. Open the CPU cabinet back door and remove the six SBI cables connecting the SFT and the unit mounted next to it.
2. Disconnect the power plugs from SFT jacks J7, J8, and J9.
3. Remove the SFT mounting hardware and carefully remove the SFT from the back of the CPU cabinet.
4. Replace the SFT with a blank SFT slot panel (from the H9602 expansion cabinet, to the left of the space) where the DW780 will be installed and attach the panel with screws provided in the installation kit.

**CAUTION**  
**A blank SFT panel must be installed to maintain proper cooling air flow.**

### 5.3.2 SFT Relocation

1. Install the SFT in the back of the CPU expansion cabinet.
2. Secure the SFT to the top and bottom of the CPU expansion cabinet card cage using the screws from the CPU cabinet.

## 5.4 DW780-CC/DD INSTALLATION

1. Remove the 4-inch blank option panel in the CPU expansion cabinet where the DW780 is to be installed.
2. Replace the blank panel with the DW780-CC/DD and attach it at the top and bottom of the cabinet card cage using the four screws provided in the installation kit.
3. Install the paddle card (Figure 5-3) on the DW780 backplane.

## 5.5 DW780 INTERCONNECTING CABLING

### 5.5.1 H7100 Cabling

1. Interconnect the DW780 and the H7100 cabling (Figure 5-4).
2. Connect the H7100 primary power cable (Figure 5-5).
3. Route the power supply cable (Figure 5-6).

### 5.5.2 SFT Cabling

Interconnect the SFT cables to DW780-CC/DD with six ribbon cables (Figure 5-7).

### 5.5.3 DW780 Cabling

1. Interconnect DW780 with the last unit in the CPU cabinet via six 18-inch ribbon cables (Figure 5-7).
2. Install protective grommets in the six expansion cabinet-to-CPU wall holes (ribbon cable holes).
3. Install UNIBUS terminator card M9044 in DW780.

## 5.6 DW780 JUMPER PLUGS

Install the starting jumper plugs (Figure 5-8).

## 5.7 DW780 DECAL

Install DW780 decals in the CPU expansion cabinet.

## 5.8 SYSTEM TURN-ON

Turn on the system (Figure 4-3) and run DW780 diagnostics.

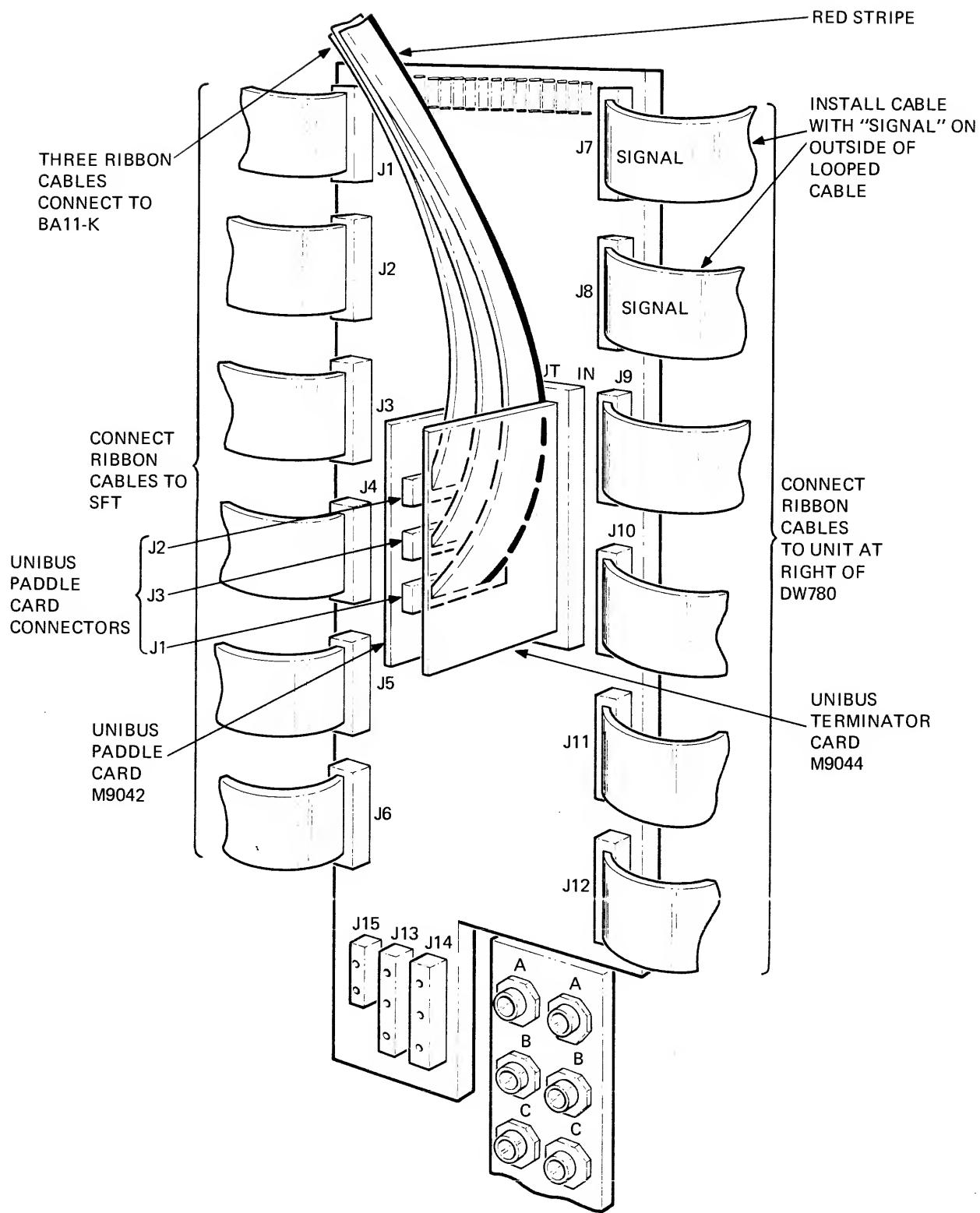
## 5.9 DW780 DIAGNOSTICS

Run one pass with the following diskettes:

1. ESKAH
2. ESKAJ
3. ESCBA
4. UETP

### NOTE

Before running diagnostics for devices on the UNIBUS see EVNDX for appropriate diagnostics.



TK-7225

Figure 5-3 DW780 Installation Details

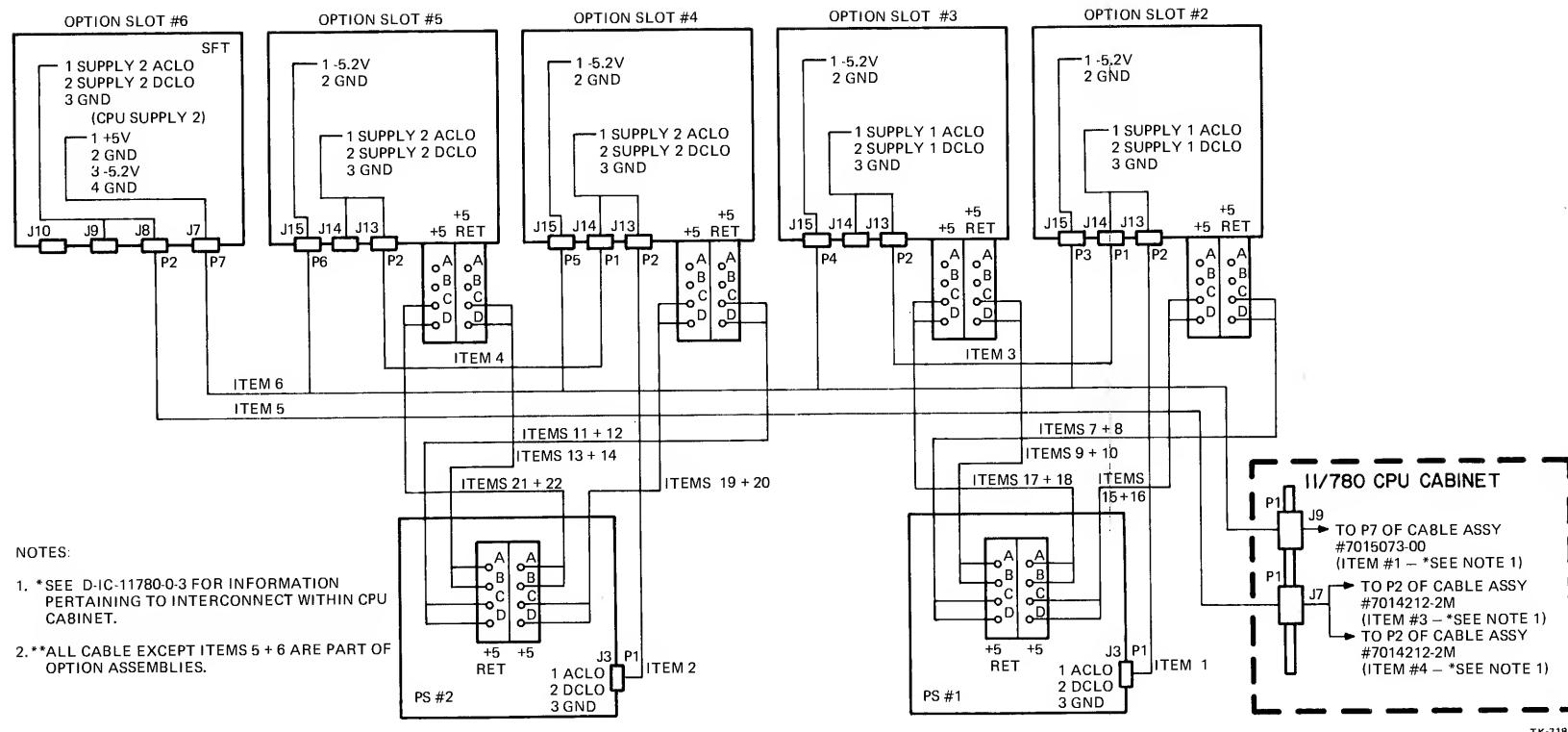


Figure 5-4 Option Power Supply Cabling (Sheet 1 of 3)

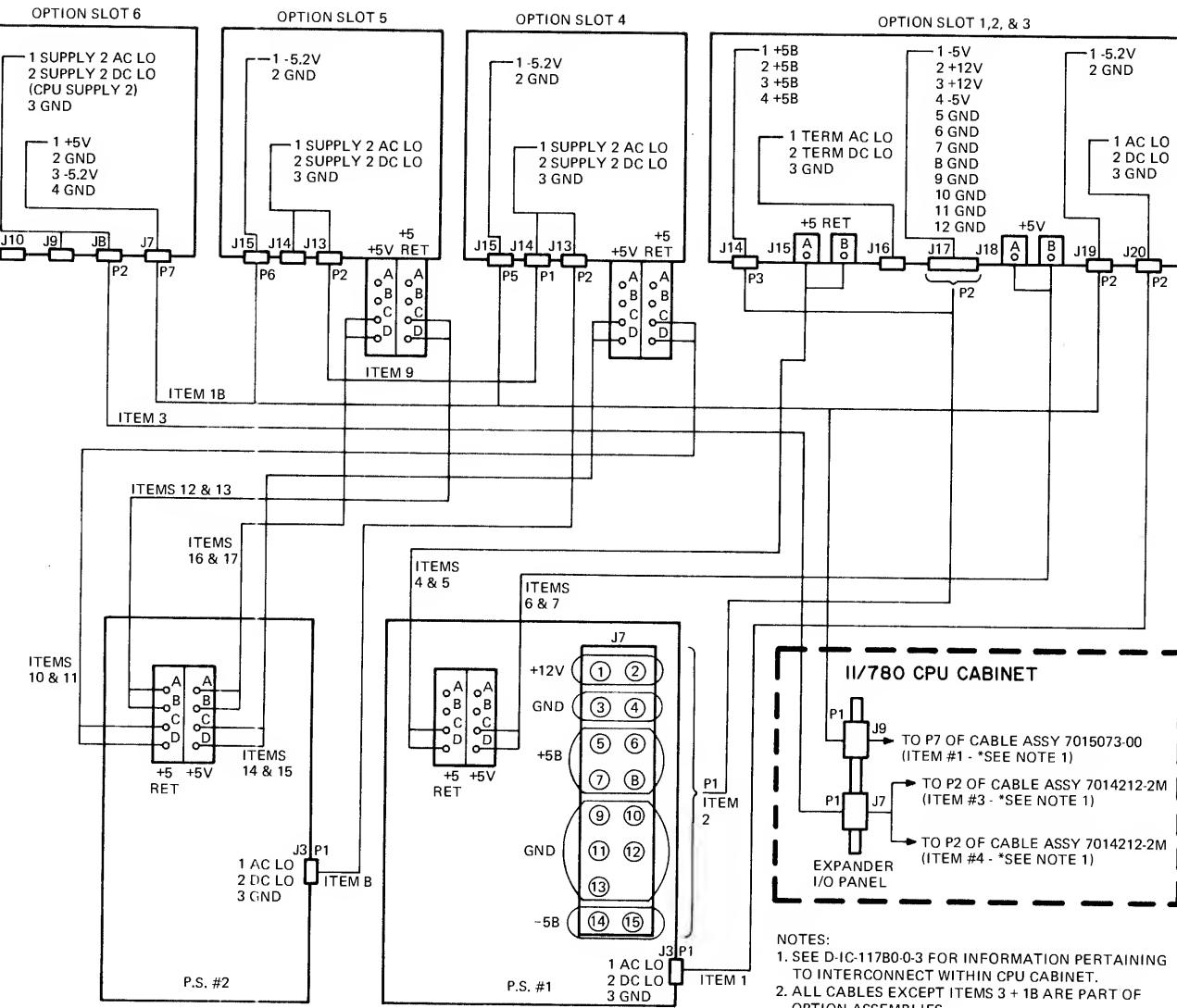


Figure 5-4 Option Power Supply Cabling (Sheet 2 of 3)

OPTION INTERCONNECT TABLE

ITEM # REF.	PART NUMBER	DESCRIPTION	FROM	TO	REMARKS
1	7014212 - 0M	CABLE,AC,DC,LO	CABLE -P1	PS #1 - J3	AC,DC,LO + GND
			-P2	SLOT 2 - J13	
2	7014212 - 0M		-P1	PS #2 - J3	
			-P2	SLOT 4 - J13	
3	7014212 - 0H		-P1	SLOT 2 - J14	
			-P2	SLOT 3 - J13	
4	7014212 - 0H	CABLE,AC,DC,LO	-P1	SLOT 4 - J14	
			-P2	SLOT 5 - J13	
5*	7015632 - 06	CABLE TO TERM BD	-P1	CPU I/O PANEL - J7	
			CABLE -P2	SLOT 6 - J8	AC,DC,LO + GND
			HARNESS -P1	CPU I/O PANEL - J9	+5V,GND,-5V,GND
6*	7015630 - 00	HARNESS TERM	-P3	SLOT 2 - J15	
			-P4	SLOT 3 - J15	
			-P5	SLOT 4 - J15	
			-P6	SLOT 5 - J15	
			HARNESS -P7	SLOT 6 - J7	+5V,GND,-5V,GND
7	7014249 - 0L	CABLE POWER (BLK)	P.S. #1 +5RET - C	SLOT 2 +5RET - C	P.S. #1 +5RETURN
8			- D	SLOT 2 +5RET - D	
9			- A	SLOT 3 +5RET - C	
10			P.S. #1 +5RET - B	SLOT 3 +5RET - D	P.S. #1 +5RETURN
11			P.S. #2 +5RET - C	SLOT 4 +5RET - C	P.S. #2 +5RETURN
12			- D	SLOT 4 +5RET - D	
13			- A	SLOT 5 +5RET - C	
14	7014249 - 0L	CABLE POWER (BLK)	P.S. #2 +5RET - B	SLOT 5 +5RET - D	P.S. #2 +5RETURN
15	7014530 - 0L	CABLE POWER (RED)	P.S. #1 +5V - C	SLOT 2 +5V - C	P.S. #1 +5V
16			- D	SLOT 2 +5V - D	
17			- A	SLOT 3 +5V - C	
18			P.S. #1 +5V - B	SLOT 3 +5V - D	P.S. #1 +5V
19			P.S. #2 +5V - C	SLOT 4 +5V - C	P.S. #2 +5V
20			- D	SLOT 4 +5V - D	
21			- A	SLOT 5 +5V - C	
22	7014530 - 0L	CABLE POWER (RED)	P.S. #2 +5V - B	SLOT 5 +5V - D	P.S. #2 +5V

NOTE:

\*ALL CABLES EXCEPT ITEMS 5 & 6 ARE PART OF  
OPTION ASSEMBLIES

OPTION INTERCONNECT TABLE

ITEM # REF.	PART NUMBER	DESCRIPTION	FROM	TO	REMARKS
1	7014212-IC	CABLE AC DC LO	CABLE P1	PS #1 - J3	AC DC LO & GND
			P2	SLOT 1,2, & 3 - J20	
2	7014234-OK	CABLE ±5BE + 12	P1	PS #1 - J7	+5B & +12
			P2	SLOT 1,2, & 3 - J17	
3*	7015632-06	CABLE TO TERM BD	P3	SLOT 1,2, & 3 - J14	
			P1	CPU I/O PANEL - J7	AC DC LO & GND
			CABLE P2	SLOT 6 - J8	
4	7014250-OK	CABLE POWER (BLK)	PS #1 +5 RET A	SLOT 1,2, & 3 - J15-A	PS #1 +5 RETURN
5			B	SLOT 1,2, & 3 - J15-B	
6	7014529-OK	CABLE POWER (RED)	A	SLOT 1,2, & 3 - J18-A	PS #1 +5V
7			PS #1 +5 RET B	SLOT 1,2, & 3 - J18-B	
B	7014212-0M	CABLE AC DC LO	CABLE P1	PS #2 - J3	AC DC LO & GND
	7014212-0M		P2	SLOT #4 - J13	
9	7014212-0H	CABLE AC DC LO	P1	SLOT #4 - J14	
	7014212-0H		CABLE P2	SLOT #5 - J13	AC DC LO & GND
10	7014249-0L	CABLE POWER (BLK)	PS #2 +5 RET-C	SLOT #4 +5 RET-C	PS #2 +5 RETURN
11			- D		- D
12	7014249-0L	CABLE POWER (BLK)	- A	SLOT #5 +5 RET-C	PS #2 +5 RETURN
13			PS #2 +5 RET-B		- D
14	7014530-0L	CABLE POWER (RED)	PS #2 +5V - C	SLOT #4 +5 - C	PS #2 +5V
15			- D		- D
16	7014530-0L	CABLE POWER (RED)	- A	SLOT #5 +5 - C	PS #2 +5V
17			PS #2 +5V - B		- D
			HARNESS -P1	CPU I/O PANEL - J9	+5V GND -5V GND
			P2	SLOTS 1,2, & 3 - J19	
			P6	SLOT 4 - J15	
			P6	SLOT 5 - J15	
18*	7015630-00	HARNESS TERM	HARNESS -P7	SLOT 6 - J7	

NOTE:

\*ALL CABLES EXCEPT ITEMS 3 & 18 ARE PART OF  
OPTION ASSEMBLIES

Figure 5-4 Option Power Supply Cabling (Sheet 3 of 3)

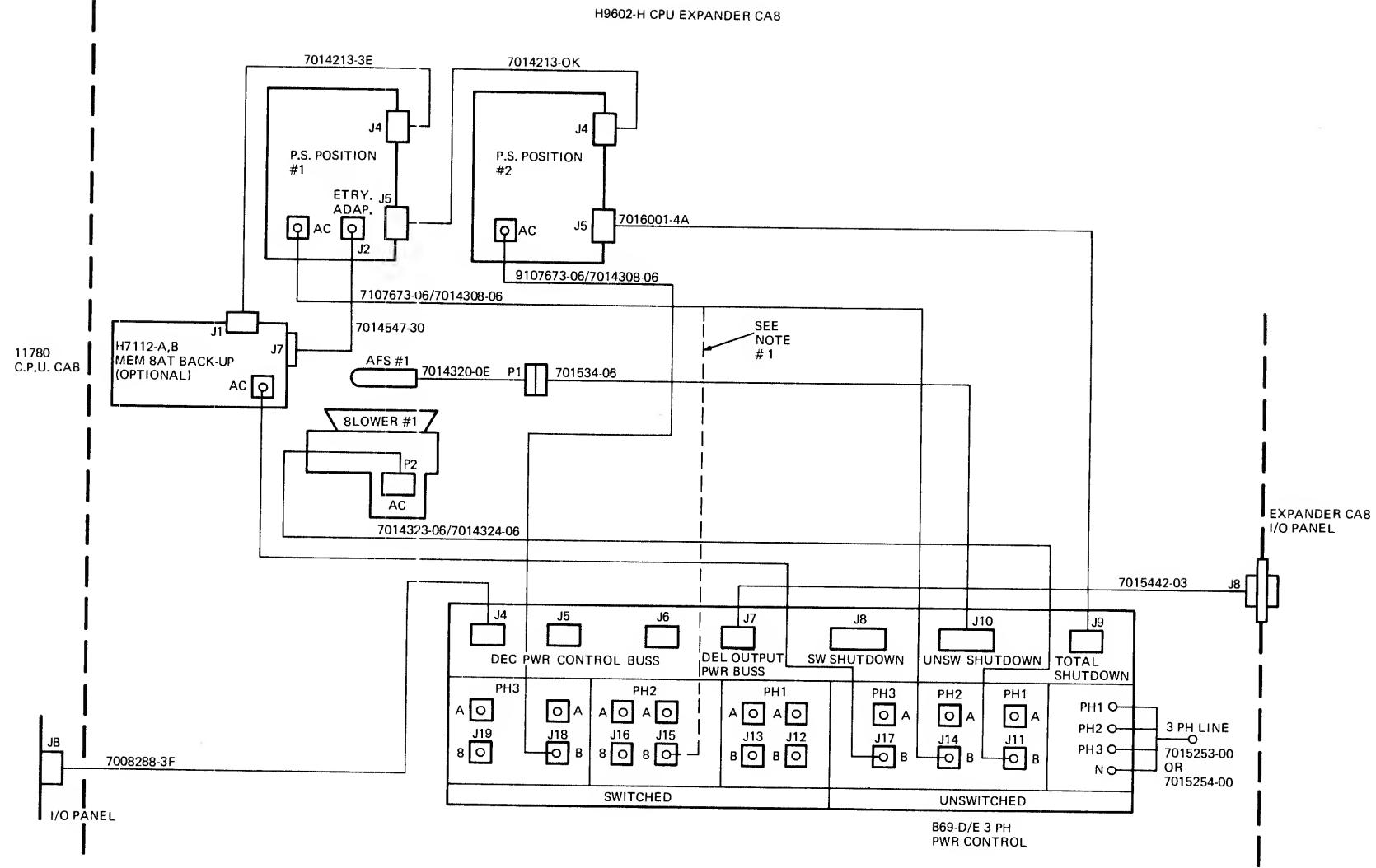


Figure 5-5 H7100 Primary Power Cabling

115 VOLT A.C. 50/60 HZ SYSTEM				
ITEM NO. (REF. ONLY)	PART NO.	DESCRIPTION	FROM	TO
1	7014323-06	POWER CORD ASS'Y (FAN 115V)	CORD-P1	869-D/J11-B
	7014323-06		CORD-P2	BLOWER-J1
2	9107673-26	EXTENSION CORD 115V 6FT.	CORD-PLUG	869-D/J14-B
	9107673-26		CORD-BACK	P.S. #1 A.C.
3	9107673-06	EXTENSION CORD 115V 6FT.	CORD-PLUG	869-D/J18-B
	9107673-06		CORD-BACK	P.S. #2 A.C. *
OPTIONAL { 4	H7112-A	BATTERY CHARGER (115V .0HZ)	A.C. CORD-PLUG	869-D/J17-B

230 VOLT A.C. 50/50 HZ SYSTEM				
ITEM NO. (REF. ONLY)	PART NO.	DESCRIPTION	FROM	TO
1	7014324-06	POWER CORD ASS'Y (FAN 230V)	CORD-P1	869-E/J11-B
	7014324-06		CORD-P2	BLOWER-J1
2	7014308-06	EXTENSION CORD 230V 6 FT.	CORD-PLUG	869-E/J14-B
	7014308-06		CORD-JACK	P.S. #1 A.C.
3	7014308-06	EXTENSION CORD 230V 6 FT.	CORD-PLUG	869-E/J18-B
	7014308-06		CORD-JACK	P.S. #2 A.C. *
OPTIONAL { 4	H7112-B	BATTERY CHARGER (230V 50 HZ)	A.C. CORD-PLUG	869-E/J17-B

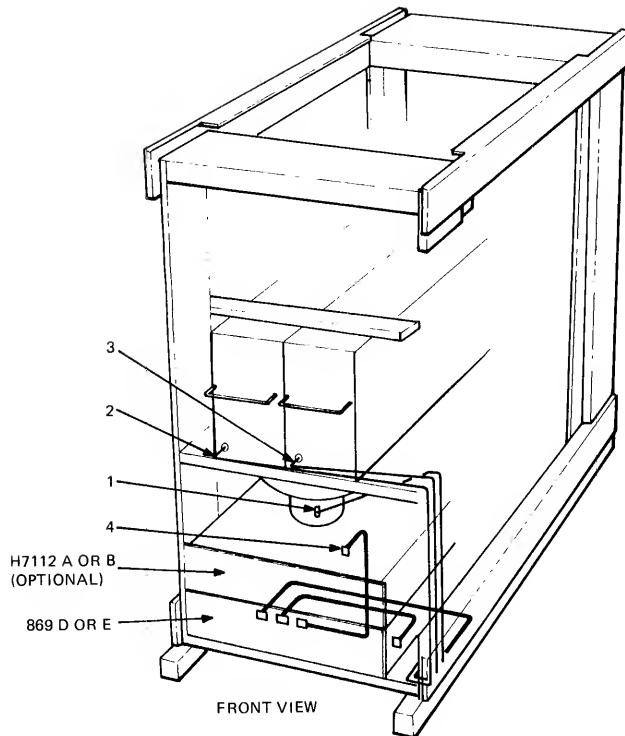
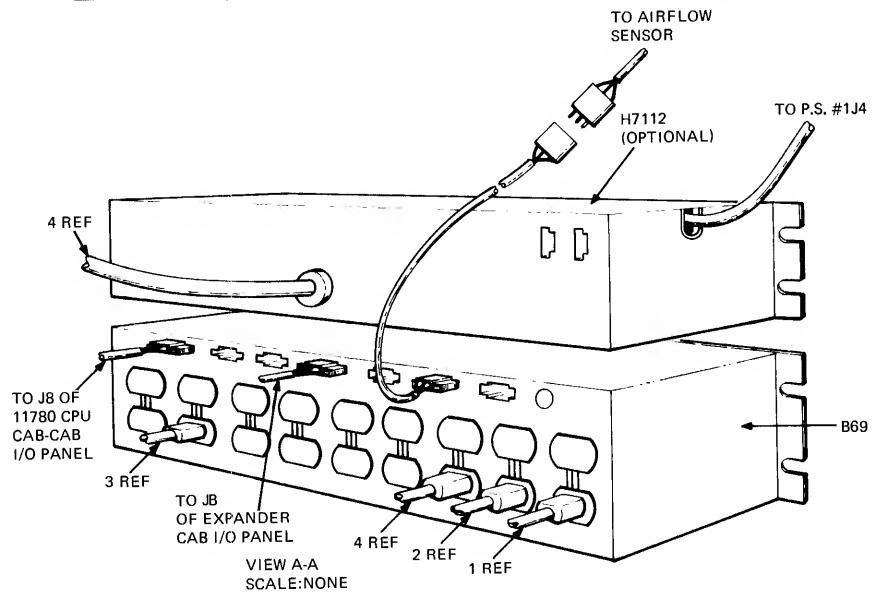


Figure 5-6 H7100 Primary Power Cable Routing

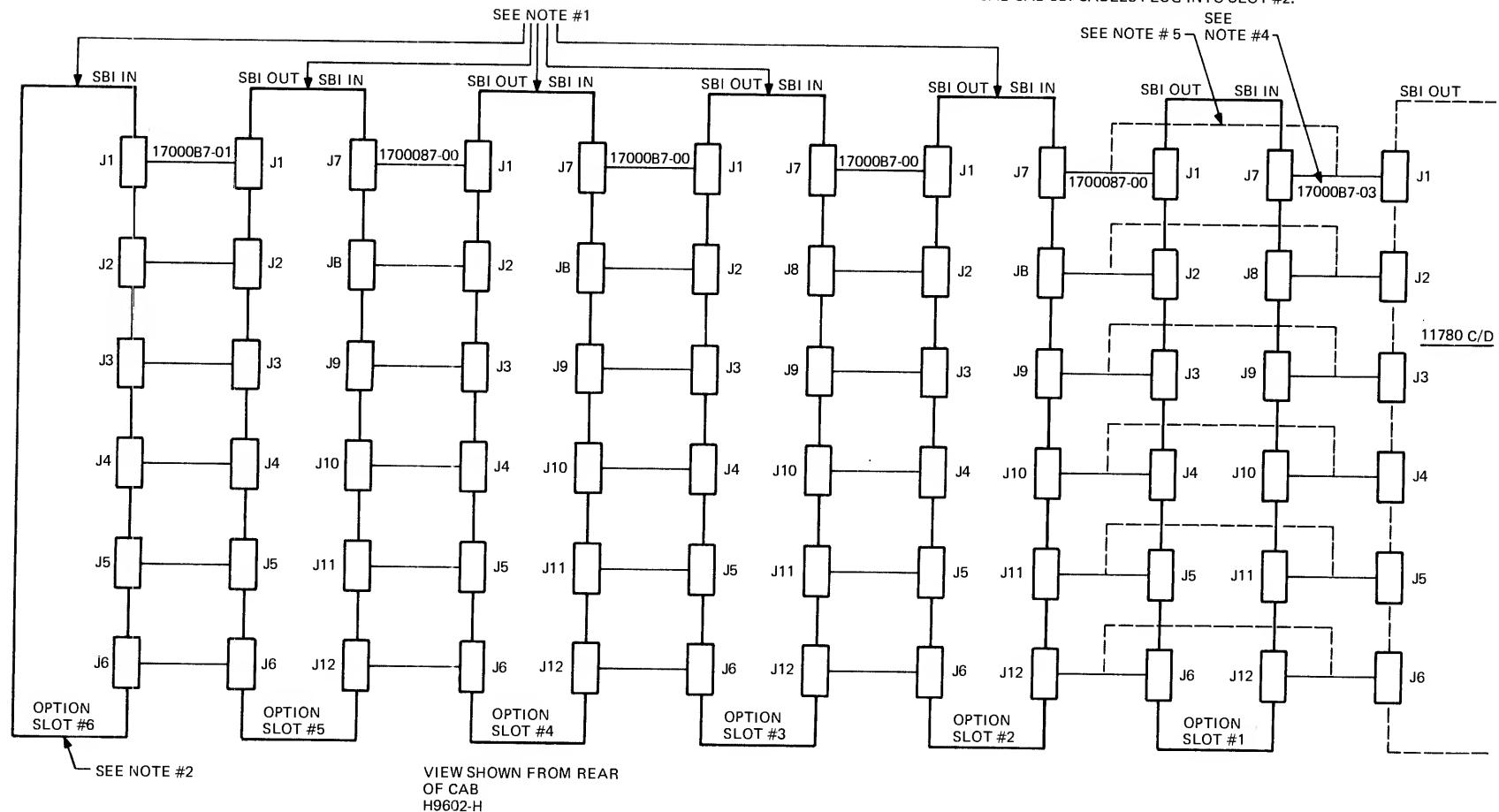


Figure 5-7 Ribbon Cable Interconnections

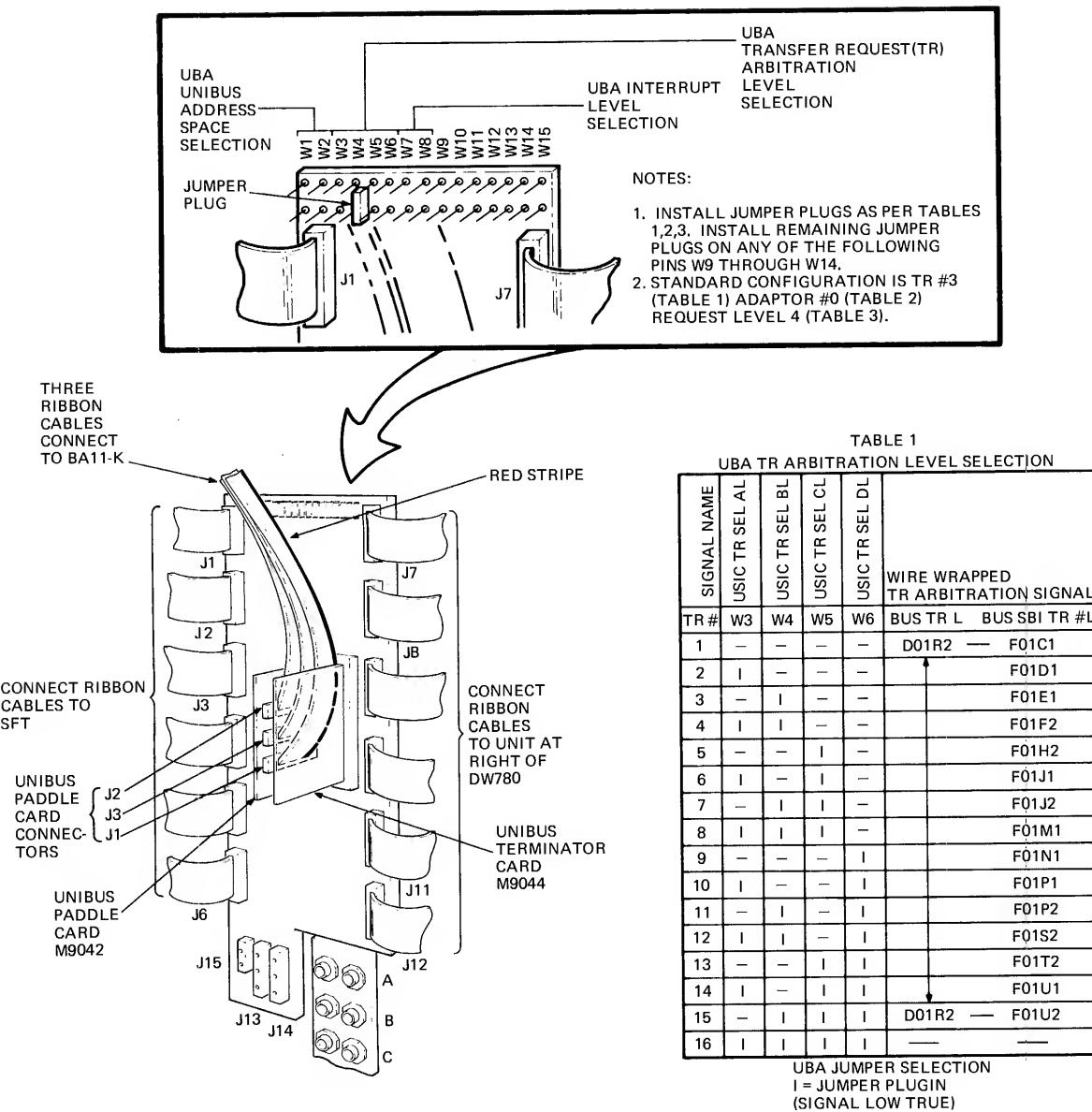


Figure 5-8 DW780 Jumper Plugs

## CHAPTER 6

# DR780 INSTALLATION

### 6.1 GENERAL

Installation of the DR780 consists of installing an H7100 power supply, the DR780 backplane assembly, and in some instances an SBI expander cabinet.

### 6.2 DR780 POWER SUPPLY INSTALLATION

1. Type SYSTEM after the “Username” prompt.
2. Type MANAGER after the “Password” prompt.
3. Type @SYS\$SYSTEM:SHUTDOWN after the dollar sign “\$” prompt.
4. Type 0 after the question “How many minutes until shutdown?”
5. Type MAINT after the “Reason?” question.
6. Type NO after the question “Do you want to skim down the disks?”
7. Remove the power supply blank cover from power supply mounting chassis and replace it with the H7100 power supply.
8. Secure the power supply at the back with the slide locking assembly.
9. Connect the two black cables (P/N 7014249-OL) to the return (ground) terminals on the power supply.
10. Connect the two red cables (P/N 7014530-OL) to the +5 volt terminals on the power supply.
11. Connect the ac/dc lo cable to the power supply (P/N 70-14212-OM).

#### NOTE

**P1 connects to J3 on power supply.**

12. Connect the overtemperature cable (P/N 7014213-OK) J4 at the back of the power supply.
13. Connect the power supply ac power cable to the power distribution box on the switched side (lower left) of the cabinet. Connect the female end of ac power cord to the front of the power supply.

## 6.3 SYSTEM FAR END TERMINATOR

### NOTE

Procedure applicable only for mounting terminator  
in an H9602-HA cabinet (SBI expander cabinet).

#### 6.3.1 SFT Removal

1. Remove and retain the six SBI ribbon cables (1700087-01) from the SBI terminator and the adjacent back panel.
2. Disconnect plugs P7, P8 and P9 from the SBI terminator.
3. Remove the SBI terminator.

#### 6.3.2 SFT Relocation

1. Install the SBI terminator assembly into the next available empty slot in the cabinet.
2. Connect the ac/dc lo cable P7 to P8 and the -5 volt cable P9 to J9 on the SFT.
3. Install the six SBI connector cables, J7 through J12 (from the adjacent adapter backplane), to J1 through J6 of the SBI terminator.
4. Apply ac power to the system. Turn on the power via the distribution panel circuit breaker and run the appropriate system diagnostics.

## 6.4 DR780 BACKPLANE INSTALLATION

1. Remove the terminator assembly from the system (paragraph 6.3).
2. Remove the blank metal tab from the next available slot.
3. Install the DR780 (Figure 6-1) in the next available slot in the cabinet using the mounting hardware.
4. Install the following jumper wires on the DR780 backplane.
  - a. TR Level Jumper – TR arbitration level jumpers for the first DR780 (W1, W2, and W4) are IN for a TR number of 12. TR arbitration level jumpers for the second DR780 (W4 and W3) are IN for a TR number of 13.
  - b. TR Wirewrap – Wirewrap BUS SBI TRXX L for DR780 at TR12 from F02L2 to F02S2. Wirewrap BUS SBI TRXX L for the DR780 at TR13 from F02L2 to F02T2.
  - c. DI Clock Jumper Select – If the DR780 is to be the clock source for the DI, then jumper W8 on back panel should be removed and stored on any backplane jumpered pins from W9 through W12 (these jumpers not used by the DR780). If the customer's device is to be the clock source for DDI, then install the jumper on pin W8.

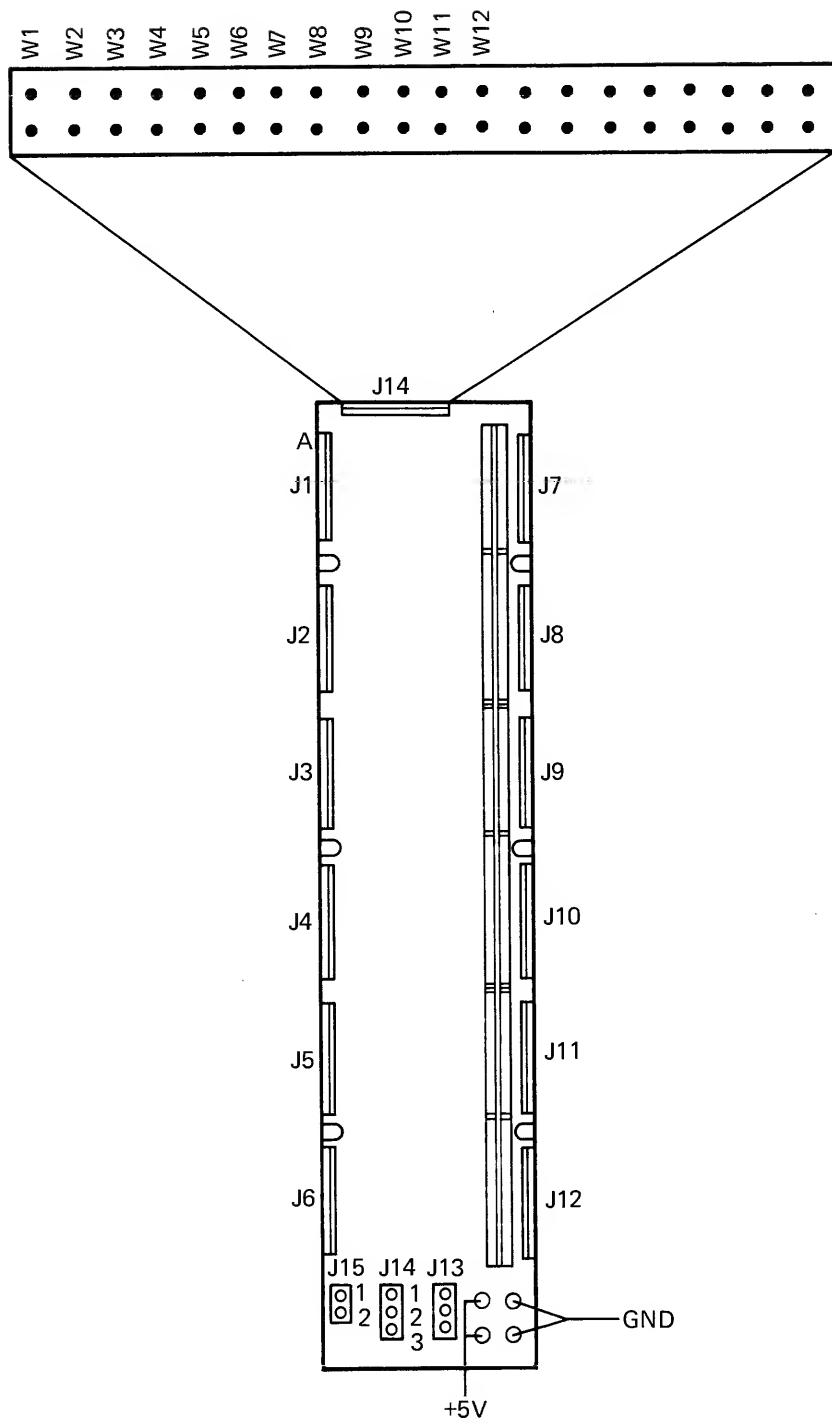


Figure 6-1 DR780 Backplane Details

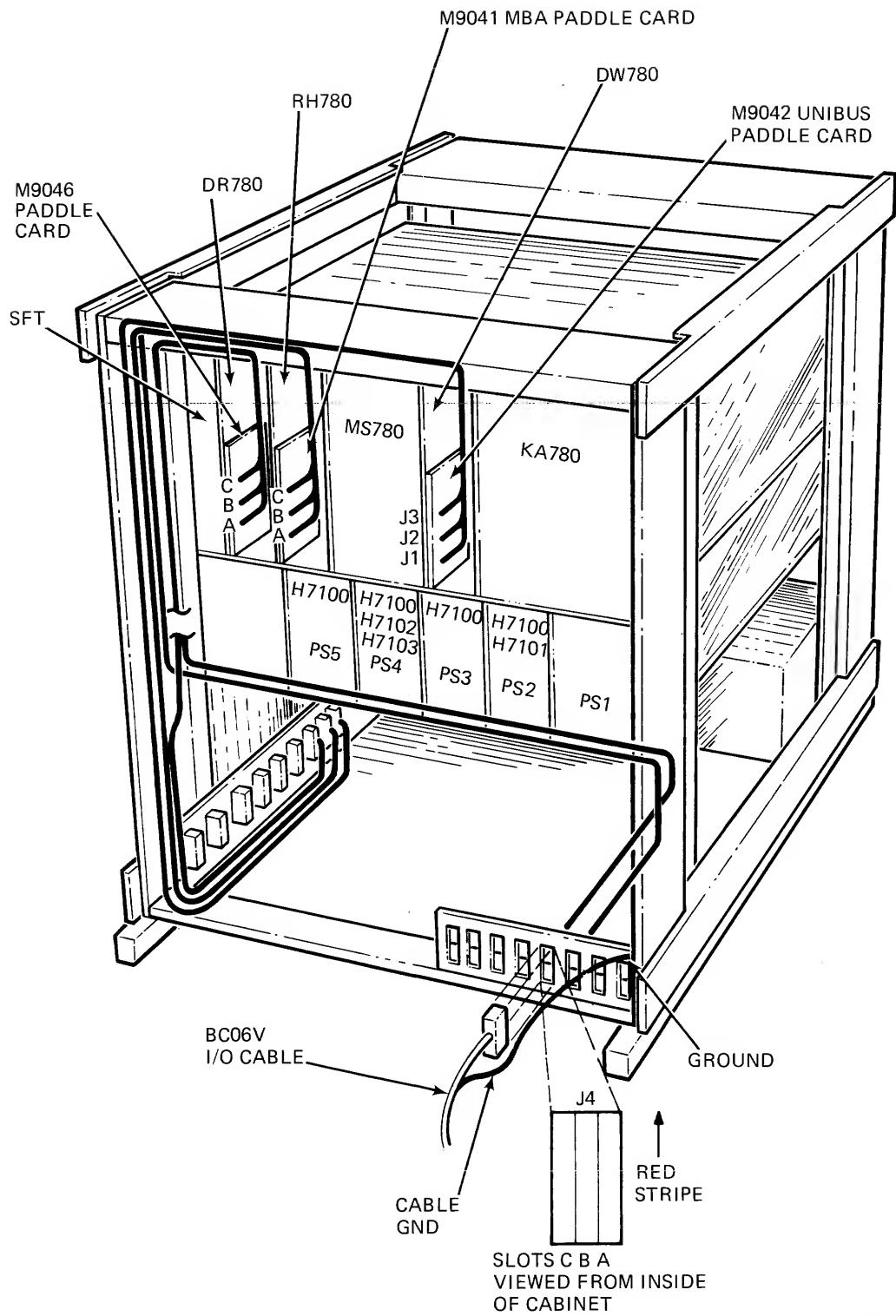
- d. MSEL Jumper Select – Install the jumper at W7 if the DR780 is not to perform DDI arbitration or be the master device. If the DR780 is to be the master device, the jumper should be installed on any pins from W9 through W12.

**NOTE**

**In a DR780 interface to DR780 interface only one device should drive MSEL and supply the clock.**

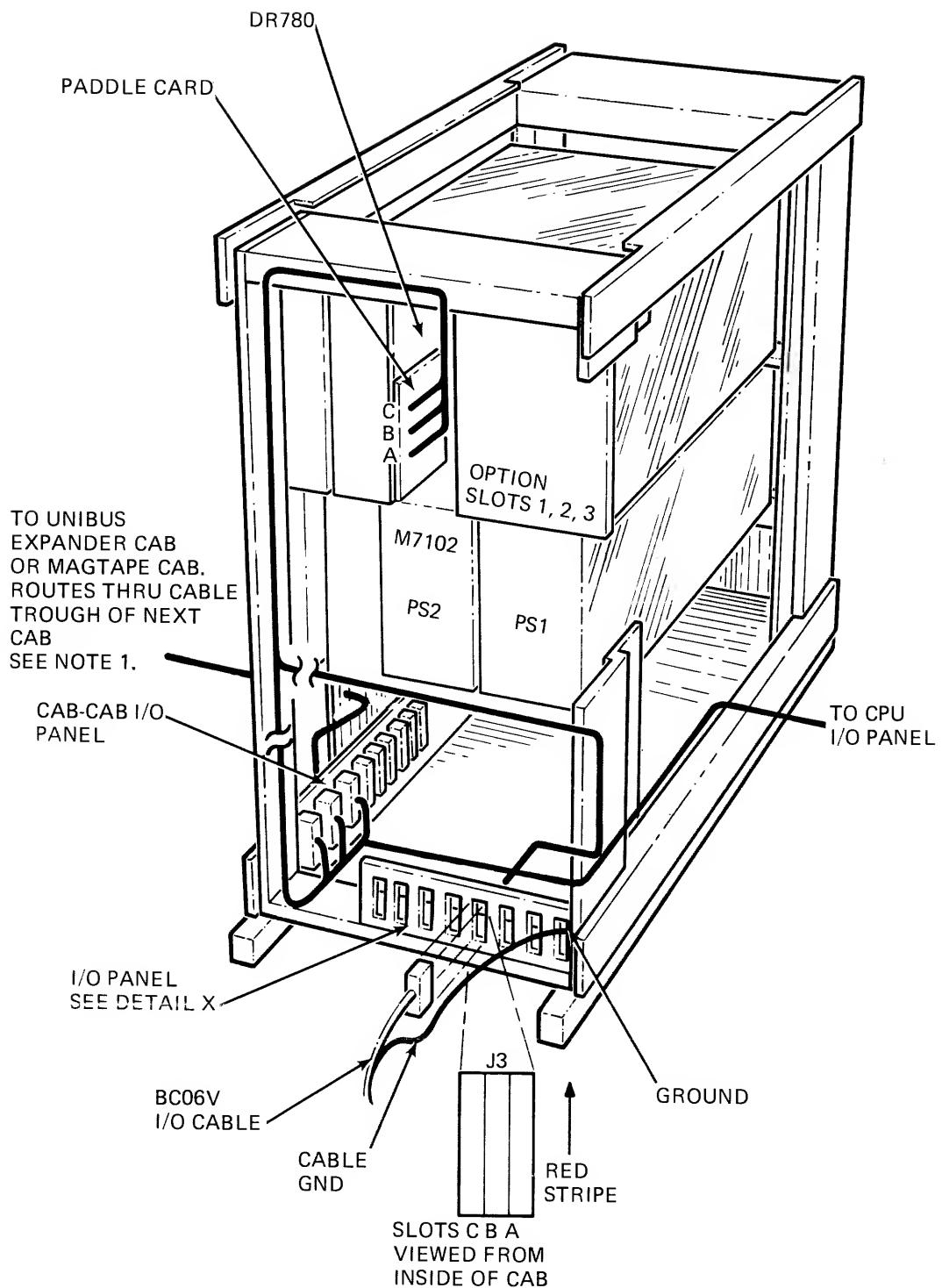
- e. Disable Wirewrap Selection – There are two signals, disable A to B and disable B to A. If the DR780 is device A, then wirewrap E03R1 to E03T2 and E03R2 to E03F2. If the DR780 is device B, then wirewrap E03R1 to E03F2 and E03R2 to E03T2.

5. Connect the ac/dc lo cable (7014212-0M) P2 to connector J14 of the DR780 backplane.
6. Install the two black power supply ground cables (7014530-0L) from the power supply ground to the left terminals of the power connectors which are on the backplane of the DR780.
7. Install the two red power supply +5 volt cables (7014249-0L) to the right terminals of the power connectors which are on the back panel of the DR780.
8. Install plug P3 of the –5 volt cable (7015630-00) to connector J15 of the DR780 backpanel.
9. Install the four-inch adjacent backplane assembly SBI cable jumpers (1700087-00) if the DR780 assembly is next to the SBI that is to be connected to backplane in cabinet. Install the adjacent backplane assembly SBI cables (1700087-03) if the DR780 is the first assembly in the SBI expander cabinet from J1 through J6 of the SBI backplane to J7 through J12 of the DR780 backplane assembly.
10. Install the DR780 paddle card (M9046-0-0) to the connector slot on the back panel of the DR780. This card should mount into the connector with the 40-pin connectors facing the right side of the cabinet.
11. Connect the three ribbon cables (BC06R-10) to the DR780 paddle card connectors A, B, and C (Figures 6-2 and 6-3).
  - a. Label the cables appropriately before installing them. Be sure that the red stripe on the cable faces the DR780 backplane.
    - 1) Cable BC06R-10 connects to the I/O connector panel in the back of the cabinet.
    - 2) Cable BC06R-25 connects the DR780 to customer's interface in a UNIBUS or magtape cabinet from the CPU I/O panel.
  - b. Route the BC06R-10 cables up toward the top of the card cage and to the left side of the cabinet.
  - c. Route the cables down the left side of the cabinet to:
    - 1) The cable trough located above the power supply chassis, then to right side of the system, if the cable is to connect to CPU I/O panel.
    - 2) Cabinet-to-cabinet I/O panel if the DR780 is to interface with the customer's interface in the adjacent cabinet.



TK-7188

Figure 6-2 DR780 Cable Route to CPU Cabinet



TK-7196

Figure 6-3 DR780 Cable Route in SBI Expansion Cabinet

d. Connect the opposite ends of the three BC06R-10 cables.

- 1) To the I/O cable connector

<b>Cable Connector</b>	<b>I/O Cable Connector Slot</b>
------------------------	---------------------------------

A	A
B	B
C	C

- 2) To the cabinet-to-cabinet I/O panel

<b>Cable Connector</b>	<b>I/O Expander Panel Connector</b>
------------------------	-------------------------------------

A	J9
B	J8
C	J7

- e. If the DR780 is connected to an external cabinet away from the VAX system, install the I/O connector to the CPU I/O panel located at the back of the cabinet. The I/O cable connector (7013678-00) is fastened to the I/O cable connector panel with four screws and nuts. The I/O cable connector goes into slot J3 for the SBI expander cabinet and into slot J4 of main CPU cabinet. The red stripe on each cable should face up from the bottom of the cabinet.
12. Connect the large BC06V I/O cable from slot J3 on SBI expander cabinet, or slot J3 or J4 from the main CPU cabinet to the customer's connector.
13. Install the SBI terminator assembly into the next available slot (paragraph 6.3).

## 6.5 SYSTEM TURN-ON

1. Apply ac power to the system by placing the main circuit breaker switch (on the ac power distribution panel, at the rear of the main CPU cabinet) in the ON position.
2. Turn on the system by turning the key-operated switch on the CPU cabinet front panel to the ON position.

## 6.6 DR780 DIAGNOSTICS

To test a DR780 which is not configured into DR, TWC CPU Link, perform the following:

1. Disconnect the DR780 from the BDI by pulling the paddle cord or removing the BC06V-25 cable.
2. Connect the E04M1 jumper pin to the E04R1 jumper pin.
3. Remove W7 and W8 from the DR780 backplane.
4. Load DR780 diskette number 1 into the diskette disk drive.
5. Type "B0" on the console terminal.

6. Wait for DS> prompt.
7. Type the following command lines:

“Attach DR780 SBI XFAO [TR#] [BR#] YES 1 CPU YES”  
“SELECT XFAO”  
“Load ESDF?” where ?=A, B, C, D or F.  
“START”

**NOTE**

**Unless you are testing a DR780 configured into a two-CPU two-DR780 link, do not run diagnostics ESDFE or ESDFG.**

Run the following diagnostic programs:

ESDFA – This is a standalone diagnostic package that uses its own microcode to test all DR780 registers, the data path, and the DUP microsequencer.

ESDFB – This is a standalone diagnostic package that uses its own microcode to test the functions of the DR780 Control Board (DCB) and DR780 microprocessor board (DUP).

ESDFC – This is a standalone diagnostic package that uses its own microcode to test all functions used by the DR780 silo module (DSM), and the out of sequence logic on the DR780, located on the DSC and DCB.

ESDFD – This program exercises the DR780 with the standard DR780 microcode. It is a stand-alone diagnostic package that checks the correct functioning of the DR780 by performing actual data transfers with different block sizes, and in different error and nonerror modes. The exercising of the DR780 is performed with all command types, with and without data chaining. ESDFD loads a copy of WCS file into the DR780 so it can be used to run the ESDFE error program.

ESDFF – This diagnostic package is a standalone diagnostic used to test the CPU-to-CPU function of the DR780 by using two DR780s. ESDFE cannot be operated if the microcode has not been loaded.

ESDFG – This package is similar to ESDFE, but it tests the DR780 in user mode.

ESDFH – This package is used to start the far end device in conjunction with diagnostic package ESDFE and is used in nonuser mode only.

Before loading the diagnostic, be sure the following connections are made:

- Jumper E04M1 to E04R1 of the DR780 backplane
- Jumper E0EM2 to E0ER2 of the DR780 backplane
- Configure jumpers W1 through W4 for the correct TR level (refer to Engineering Drawing E-UA-DR780-0-0, sheet 2).
- Make sure the correct connection is made on backplane for the TR level selected in step 3 (refer to wirewrap table on Engineering Drawing E-UA-DR780-0-0, sheet 2).
- Configure jumpers W5 and W6 for BR of six, W5 IN, W6 OUT.
- Make sure that W7 and W8 are not installed on the DR780 backplane.
- Disconnect the DR780 from the customer's device if the DR780 is not part of a DR780-to-DR780 link.

Use the following procedure to load the diagnostic program into the system:

1. Put the VAX-11/780 in a stable, halted condition.
2. Initialize and unjam the SBI via the console commands:

INIT  
UNJAM

3. Load the diagnostic supervisor ESSAA.EXE using the command BOOT or LOAD ESSAA.EXE/ST:FE00 (from the diskette) or RUN ESSAA (for user mode diagnostic).
4. Load the diagnostic program by its designation letters, i.e., LOAD ESDFA (ESDFA is the program ID).
5. Attach the device to be tested; ATTACH DR780 SBI (UNIT #) (TR LEVEL) 6 YES 1 CPU YES for DR780 self-test diagnostics (A, B, C, D, and F) only. Check the individual diagnostic listing for a complete list of attachments needed to operate the diagnostic.
6. Select the unit to be tested via the command SELECT and UNIT # (i.e., SELECT XFAO:).
7. Set any desired supervisor flags.
8. START the program.

When running diagnostics for the first time after an installation of the DR780, run in ascending order from ESDFA to ESDFG.

## 6.7 LOADING THE DR780 MICROCODE

Use the following procedure to load the DR780 microcode from the diskette.

### NOTE

**The microcode must be loaded into the DR780 each time the DR780 is power enabled.**

1. Log in as the system manager by getting the customer to log on.
2. Once the system is available for use under the system manager, type:

**\$ SET DEFAULT [SYSUPD]**

3. Load the DR780 microcode diskette in the disk unit, type:

**\$ @VMSUPDATE**

4. Answer the question asked by the system.
5. Remove the diskette from the disk unit, type:

**\$ RUN SYS\$SYSTEM:XFLOADER**

This loads the DR780 microcode into the WCS RAM of the DR780.

It is recommended that the above command be put into the system startup file.

## 6.8 USING UETP TO TEST DR780

The following must be done in order to use the User Environment Test Package (UETP).

1. The DDI cable must be disconnected from the DR780 to be tested. If this cable is BC06V-\*, it is located at the bottom of the back of the cabinet that holds the DR780. If this cable is BC06B-R, the paddle card should be removed from the backplane of the DR780.
2. The file XF780.ULD (DR780 microcode file) must exist in SYS\$SYSTEM:. It must be copied to the system disk from the diagnostic media.
3. With the DR780 power removed the following backplane jumper changes must be made.
  - a. Remove the jumpers from W7 and W8 (at the top of the backplane).
  - b. Add the jumpers from E04M1 to E04R1.
  - c. Add the jumpers from E04M2 to E04R2.
  - d. Refer to *UETP User's Guide* (AA-D643A-TE) for startup of the UETP.

## CHAPTER 7

# MASSBUS ADAPTER

### 7.1 GENERAL

The MASSBUS adapter (MBA) RH780 is the hardware interface between the SBI and high speed MASSBUS storage devices. The MBA installation kit includes:

- RH780 card cage and backplane assembly
- H7100 power supply
- Blank SBI slot panel
- Interconnecting cables
- Expansion cabinet RH780 decal

### 7.2 RH780 POWER SUPPLY (H7100) INSTALLATION

Turn off the system (Figure 4-1). Determine the use of H7100 included in the option installation kit (Figure 5-1). If an H7100 is not required inform the customer of H7100 spare status then proceed with the option installation procedure. If an H7100 is required, remove the blank power supply panel. Install the H7100 with the mounting hardware and the slide lock (Figure 5-2).

### 7.3 SYSTEM FAR END TERMINATOR RELOCATION

#### 7.3.1 SFT Removal

1. Open the back door of the CPU cabinet and remove the six SBI cables connecting the SFT and the adjacent NEXUS.

#### NOTE

A NEXUS is any device which connects to the SBI.

2. Disconnect the power plugs from SFT jacks J7, J8, and J9.
3. Remove and keep the two screws holding the SFT to the top of the card cage.
4. Open the CPU cabinet front door and remove and keep the four screws holding the SFT to the bottom of the card cage.
5. Carefully remove the SFT from the back of the CPU cabinet.
6. Install the blank SFT slot panel using the screws provided in the installation kit.

### 7.3.2 SFT Relocation

1. Install the SFT in the back of the CPU expansion cabinet to the left of the space where the RH780 will be installed.
2. Attach the SFT at the top and bottom using the screws from the CPU cabinet.

## 7.4 RH780 INSTALLATION

1. Remove the two screws holding the blank option panels in the CPU expansion cabinet (where the RH780 will be installed) then remove the two panels.
2. Install the RH780 attaching it to the top and bottom of the cabinet card cage with the four screws provided in the installation kit.
3. Install the RH780 paddle card (Figure 7-1).

## 7.5 RH780 INTERCONNECTING CABLING

### 7.5.1 H7100 Cabling

1. Interconnect the RH780 and the H7100 (Figure 5-4).
2. Connect the primary H7100 power cable (Figure 5-5).
3. Route the power supply wiring (Figure 5-6).

### 7.5.2 SFT Cabling

Interconnect the SBI cables to RH780 with the six ribbon cables (Figure 5-7).

### 7.5.3 RH780 Cabling

If the RH780 is the last NEXUS in the CPU cabinet and a H9602-HA (SBI expander cabinet) is present, connect the two cabinets via six 18-inch ribbon cables (Figure 5-7).

## 7.6 RH780 JUMPER PLUGS

Install the jumper plugs (Figure 7-2).

1. Select TR8-11 via a jumper plug.
2. Select BR level 5 via a jumper plug.

## 7.7 SYSTEM TURN-ON

Turn on the system (Figure 4-3) then perform RH780 diagnostics.

## 7.8 RH780 DIAGNOSTICS

Run one pass each with the following diskettes:

1. ESKAH
2. ESKAJ
3. ESKAA

### NOTE

Run diagnostics for devices attached to the MASS-BUS. See EVNDX for appropriate diag-4 UTEP.

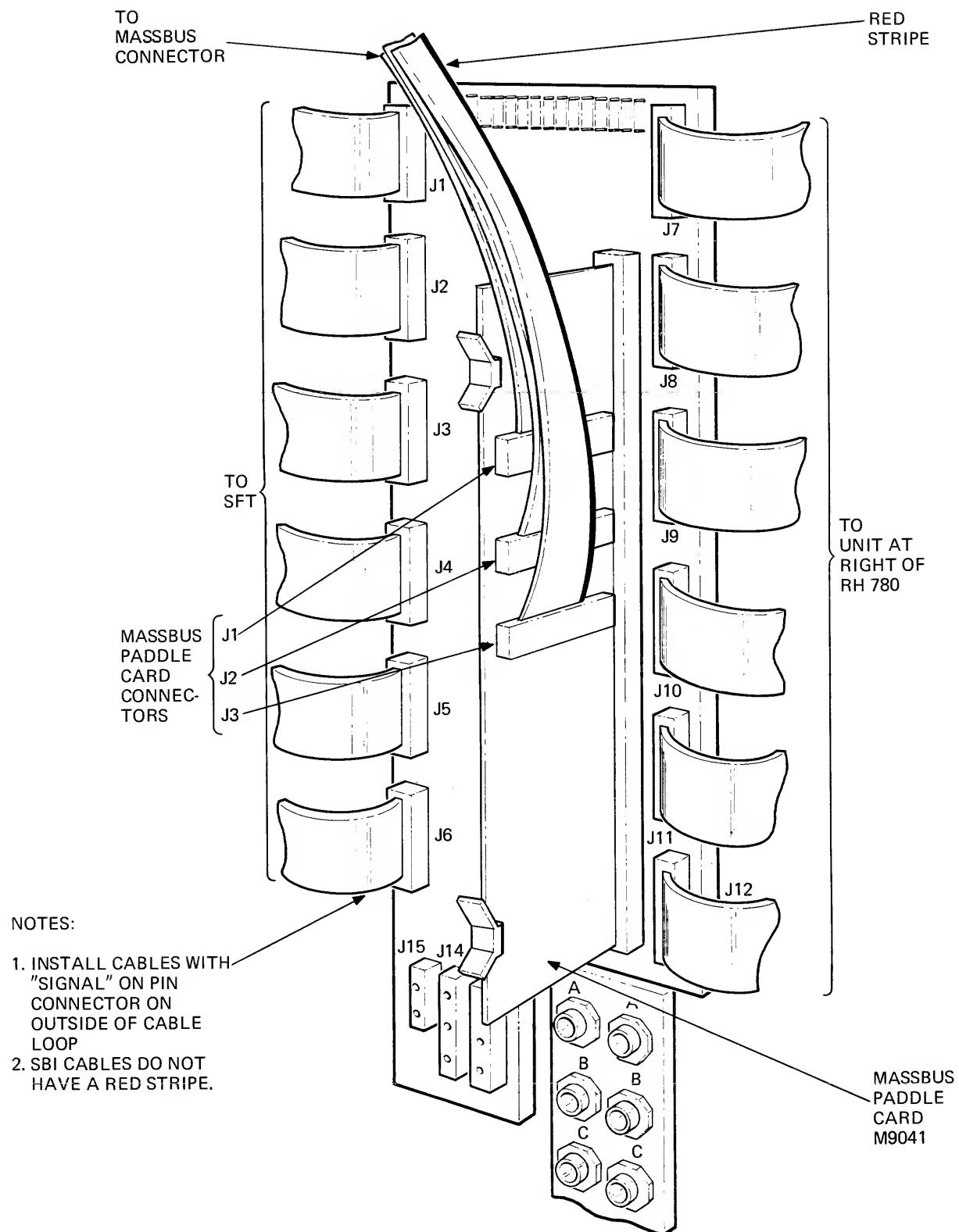


Figure 7-1 RH780 Installation Details

TK-7226

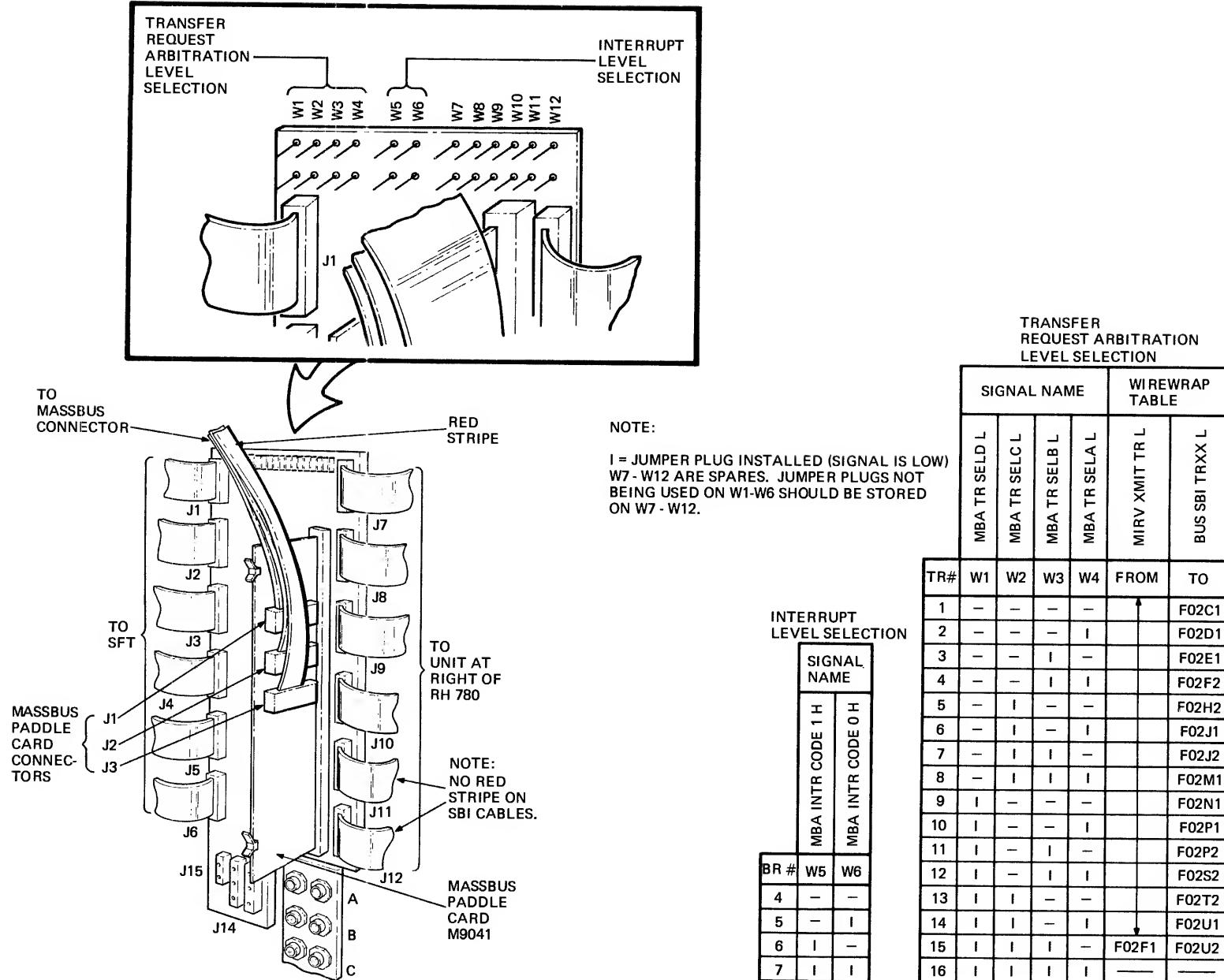


Figure 7-2 Transfer Request Arbitration, Interrupt Level Details

## CHAPTER 8

# MOS MEMORY ASSEMBLY

### 8.1 GENERAL

The MOS memory assembly MS780-CC/DD is a 512K byte ECC MOS, 16K chip memory with a controller. It is installed in the CPU expansion cabinet H9602-HA/HB. The MS780-CC/DD installation kit includes:

- MS780-CC/DD card cage and modules
- H7100 power supply
- Blank SBI slot panel
- Interconnecting cables
- Expansion cabinet MS780-CC/DD decal

### 8.2 MS780 POWER SUPPLY (H7100) INSTALLATION

Turn off the system (Figure 4-1). Determine the use of H7100 included in the option installation kit (Figure 5-1). If an H7100 is not needed, inform the customer of the H7100 spare status and proceed with the option installation procedure. If an H7100 is needed, remove the blank power supply panel and install the H7100 using the mounting hardware and slide lock (Figure 5-2).

### 8.3 SYSTEM FAR END TERMINATOR (SFT)

#### 8.3.1 SFT Removal

1. Open the back door of the CPU cabinet and remove the six SBI cables interconnecting the SFT and the adjacent unit.
2. Disconnect the power plugs from SFT jacks J7, J8, and J9.
3. Remove the SFT mounting hardware and carefully remove the SFT out of the back of the CPU cabinet.
4. Replace the SFT with a blank SFT slot panel using the screws provided in the installation kit.

#### 8.3.2 SFT Relocation

1. Install the SFT in the back of the CPU expansion cabinet to the left of the space for the DW780 installation.
2. Attach the SFT to the top and bottom of the CPU expansion cabinet card cage using the screws from the CPU cabinet.

## **8.4 MS780 INSTALLATION**

1. Remove the two screws holding the blank option panels (to the right of the SBI) in the CPU expansion cabinet where the MS780 will be installed. Remove the two panels.
2. Install the MS780-CC/DD attaching it at the top and bottom of the cabinet card cage with the four screws provided in the installation kit.

## **8.5 INTERCONNECTING CABLING**

### **8.5.1 H7100 Cabling**

Perform H7100 cabling (Figures 5-4 through 5-6).

### **8.5.2 SFT Cabling**

Interconnect the SFT cables to MS780-CC/DD using the six ribbon cables (Figure 5-7).

### **8.5.3 MS780 Cabling**

1. Interconnect the MS780 with the last unit in the CPU cabinet via six 18-inch ribbon cables (Figures 5-7 and 8-1).
2. Secure the intercabinet cabling with tie wraps.

## **8.6 MS780 STARTING ADDRESS/TRANSFER REQUEST STRAPPING**

Install the starting address/transfer request strapping MS780 (Figure 8-2).

## **8.7 MS780 DECALS**

Install MS780 decals in the CPU expansion cabinet.

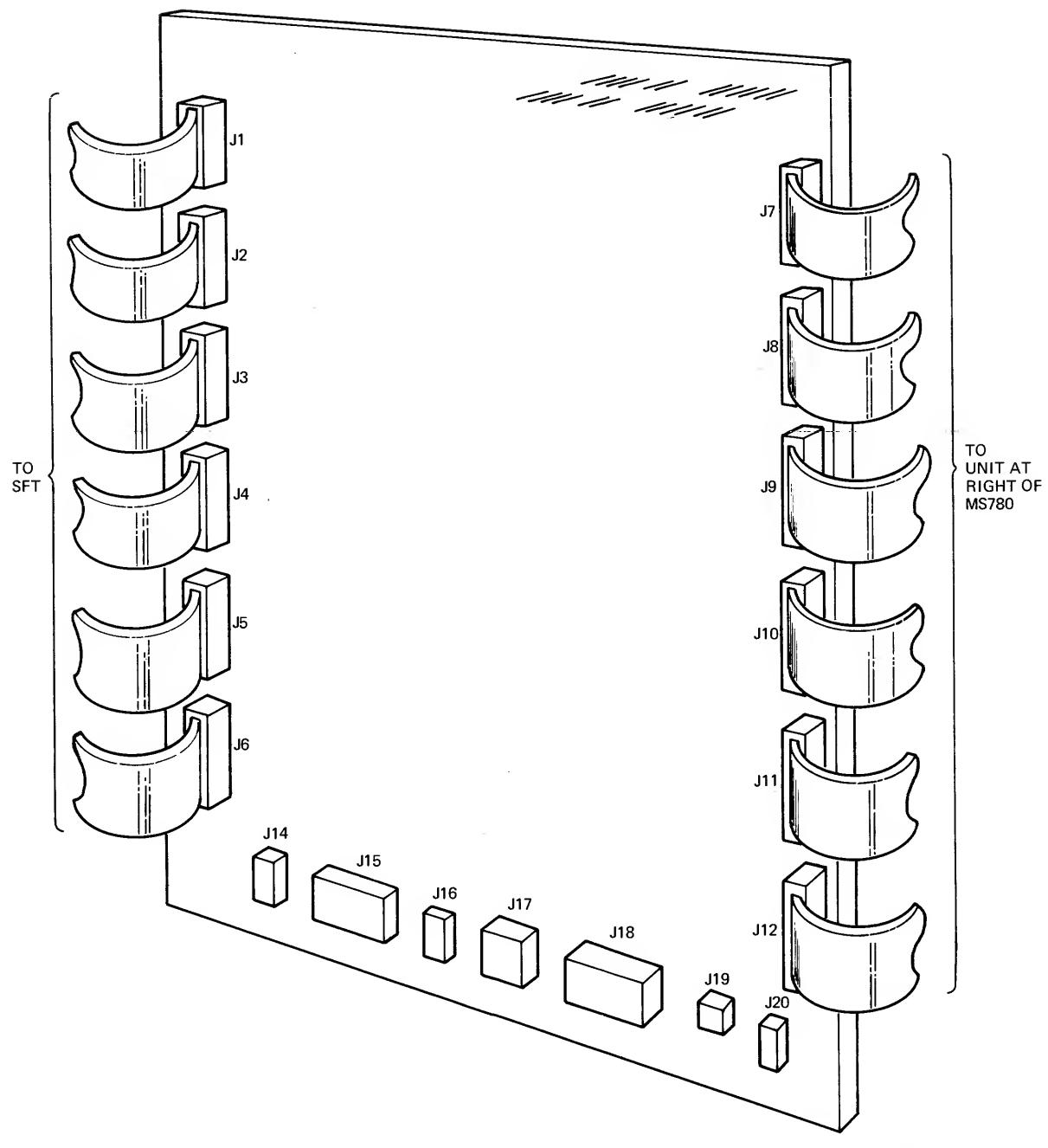
## **8.8 SYSTEM TURN-ON**

Turn on the system (Figure 4-3) and perform MS780 diagnostics.

## **8.9 MS780 DIAGNOSTICS**

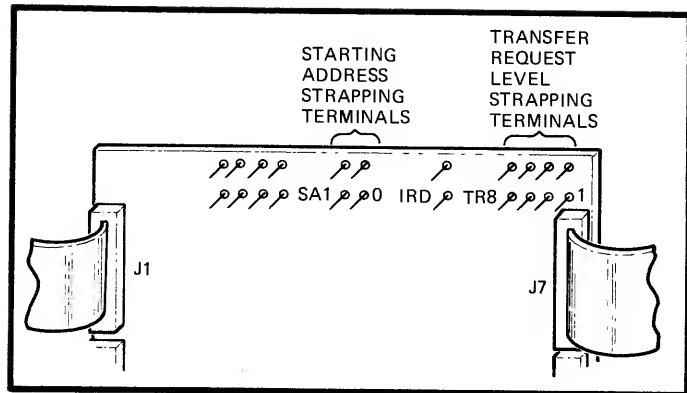
Test the MS780 with the following:

1. ESKAH
2. ESKAJ
3. UETP



TK-7224

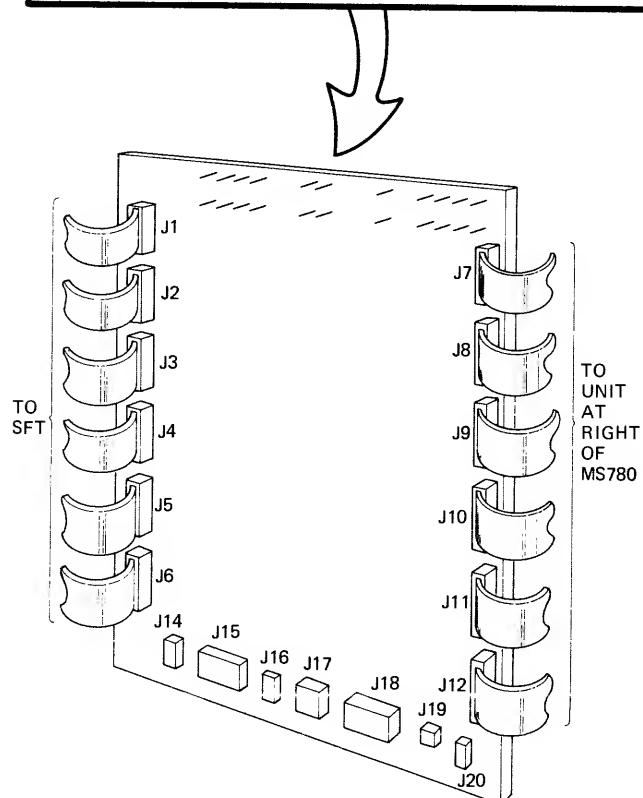
Figure 8-1 MS780 Installation Details



NOTE:

I = JUMPER PLACED ACROSS PAIR OF PINS DESIGNATED.

- = NO JUMPER.



STARTING ADDRESS STRAPPING		
SA1	SA0	MEMORY CONTROLLER STARTING ADDRESS AFTER COLD POWER UP ONLY
-	-	0 MEGA BYTE
-	I	4 MEGA BYTE
I	-	8 MEGA BYTE
I	I	12 MEGA BYTE

TR LEVEL STRAPPING				
8	4	2	1	BACKPLANE WIRE F20K2 TO ---
-	-	-	-	F20C1
-	-	-	I	F20D1
-	-	I	-	F20E1
-	-	I	I	F20F2
-	I	-	-	F20H2
-	I	-	I	F20J1
-	I	I	-	F20J2
-	I	I	I	F20M1
I	-	-	-	F20N1
I	-	-	I	F20P1
I	-	I	-	F20P2
I	-	I	I	F20S2
I	I	-	-	F20T2
I	I	-	I	F20U1
I	I	I	-	F20U2

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Figure 8-2 MS780 Starting Address, Transfer Request Arbitration Level Details

## CHAPTER 9

### MA780 MULTIPORT MEMORY

The MA780 Multiport Memory is not one simple option but is a series of MA780 options ranging from A to F. A general description of the hardware follows.

MA780AA 60Hz  
MA780AB 50Hz

The MA780A is a VAX-11/780 Multiport Memory in a modified highboy (H9602) corporate cabinet with a Memory Power Supply, an 869 power controller, two MA780C interconnect units and an optional H7112 battery backup unit. The MA780A comes with 256 kilobytes of memory which is expandable to a maximum of 2 megabytes.

MA780BA 60Hz  
MA780BB 50Hz

The MA780 is a VAX-11/780 Multiport Memory with a memory power supply, two MA780C interconnect units, and an optional H7112 battery backup unit. The MA780B also comes with 256 kilobytes of memory which is expandable to a maximum of 2 megabytes. The MA780B is installed in the MA780A cabinet. The cabinet holds two multiport memories.

MA780C

The MA780C connects the SBI to the MA780A/B. It has a 3 1/4-inch backplane which goes in the CPU or SBI expander cabinet, cables, and M9045 paddle cards. The MA780C backplane is connected to the SBI. The M9045 paddle cards plug into the MA780A/B and MA780C backplanes. The bidirectional data interconnect cables (BDI) connect the M9045s on the MA780A/B to the M9045s on the MA780C. The MA780C can be ordered alone only with the purchase of a configured system (MA780E).

MA780D

The MA780D is the MA780A/B Multiport Memory Selective Cache Invalidate option. It is a single M8210 memory array board which is plugged into slot 9 in the MA780A/B backplane. It requires no further action.

MA780EA 60Hz  
MA780EB 50Hz

The MA780E consists of an MA780C and an H7100 Power Supply. This option is the only way MA780C add-ons can be ordered.

MA780F

The MA780F has a H9604 left expander kit, an H9504-XE joiner kit, and two plenum weld panels. One MA780F is needed to change a two VAX-11/780 system configuration to a three VAX-11/780 system configuration. Another MA780F is then needed to change a three VAX-11/780 system configuration to a four VAX-11/780 system configuration.

## 9.1 MA780 SYSTEM CONFIGURATIONS

The MA780 can be configured with two to four VAX-11/780 systems. With two systems the cabinets are arranged in a straight line. The three-system configuration is a "T", and the four-system configuration uses a "pi" arrangement.

### NOTE

**The procedures used in this chapter assume that the VAX-11/780 systems to be worked on have been properly halted and powered-down. The main circuit breakers on the power controllers of all systems are set to OFF and all ac connections to the systems have been removed.**

#### 9.1.1 Two-System MA780A Configuration

A two-system configuration consists of one MA780, two VAX-11/780 CPUs, and an H9604 left expander kit. Figure 9-1 shows that the main CPU/SBI expander cabinet units are adjacent to the MA780 cabinet. One of the two systems to be joined must be arranged to match the configuration shown in Figure 9-1. Engineering drawing H9604-AA can be used as a reference during this assembly process.

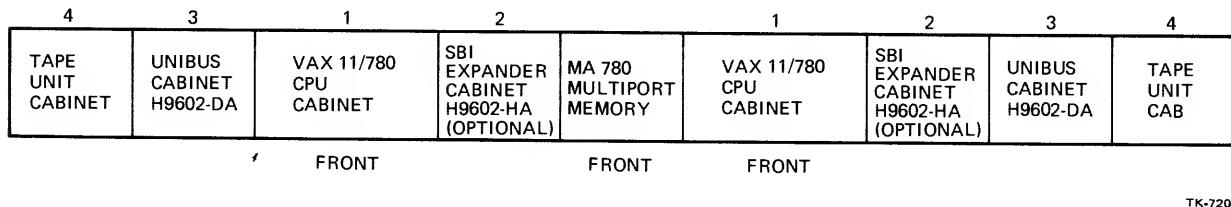
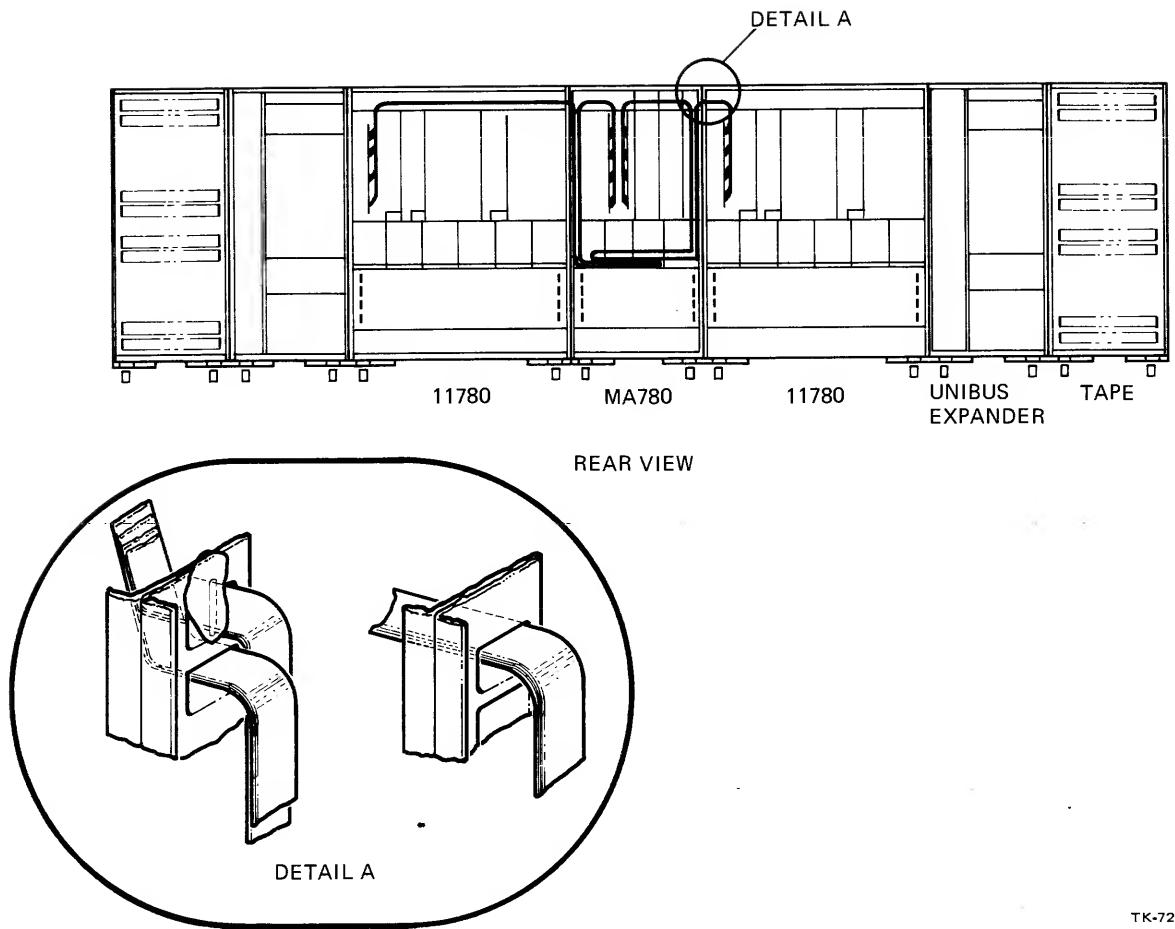


Figure 9-1 Two-System Cabinet Arrangement

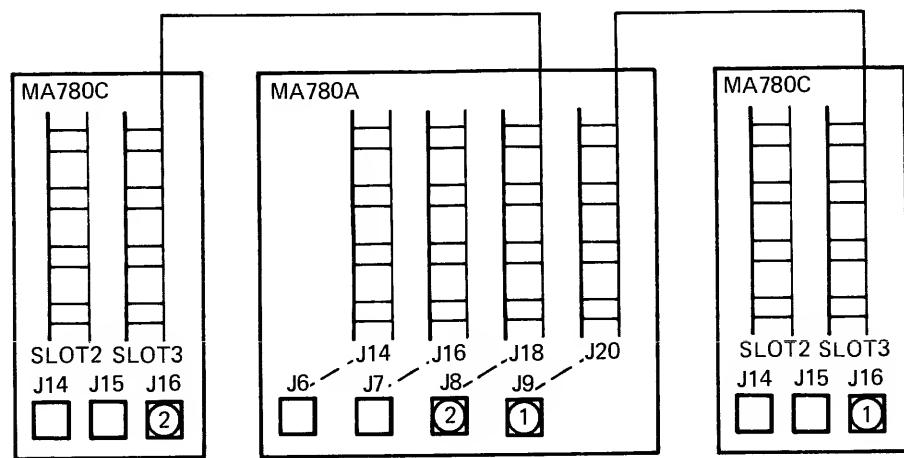
The MA780-A is installed using the following procedure.

1. Halt and power down the two systems. Set the main circuit breaker on the power controllers of both systems to OFF and remove all ac connections to the systems.
2. Select the system to be on the left of the MA780. Disconnect all cables going to and from the main CPU/SBI expander cabinet unit of that system.
3. Install an MA780C backplane assembly in each of the two CPU (or SBI expander) cabinets (paragraph 9.2.1).
4. Install the H9604 left expander kit in the cabinet of the CPU which is to be on the left of the MA780 cabinet (paragraph 9.7).
5. Move cabinets together (Figure 9-1) and connect the cables to the left CPU/SBI expander cabinet unit (cables disconnected in step 2).
6. Install the BDI from the MA780C to the MA780A cabinet (Figures 9-2 and 9-3). Refer to paragraph 9.3.2.1 for directions on installing the BDI cables.



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Figure 9-2 Two-System BDI Cable Routing



NOTES:

1. MA780A J20 ASSOCIATED WITH J9, ETC
2. ① CONNECTS TO ①, ETC.

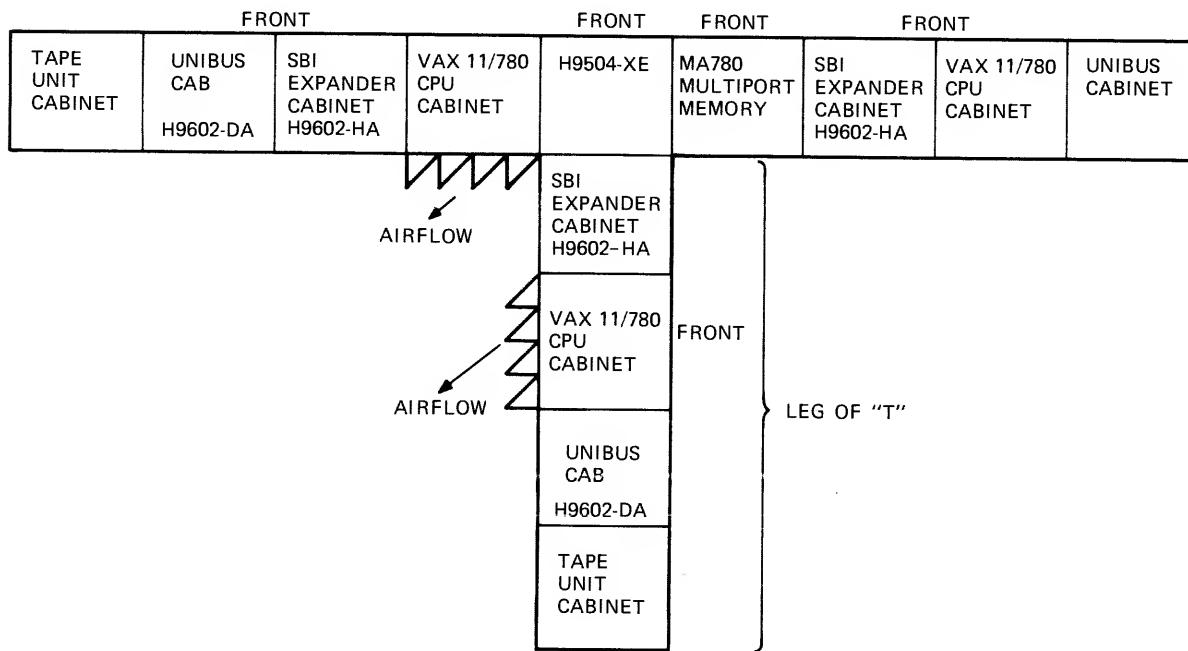
TK-7430

Figure 9-3 Two-System BDI Cable Connections

### 9.1.2 Three-System MA780 Configuration

**9.1.2.1 MA780A** – This paragraph describes the installation procedure for a three VAX-11/780 system with one MA780 multiport memory. The systems are installed in a “T” configuration using an H9604 left expander kit and an MA780F option.

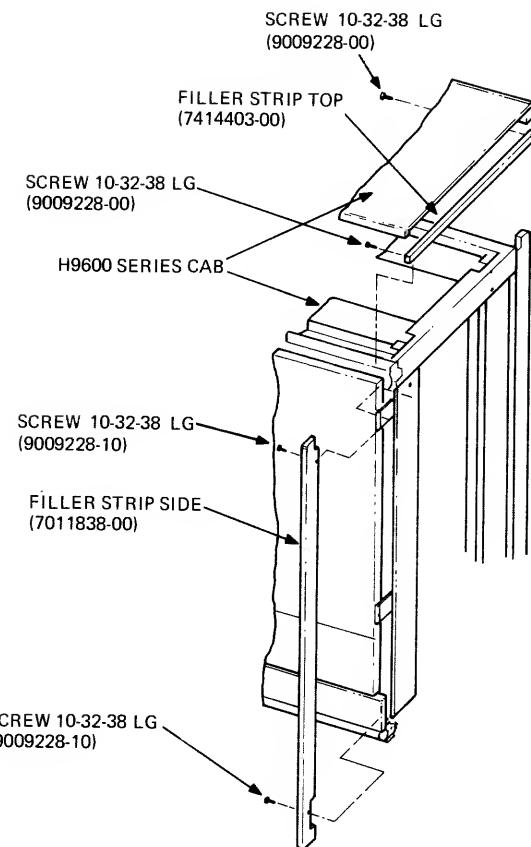
1. Halt and power down the three systems. Set the main circuit breaker on the power controllers of all systems to OFF and remove all ac connections to the systems.
2. Two of the three systems must be arranged to expand to the left for the “T” configuration. Disconnect all cables going to and from these two CPU/SBI expander units. Disassemble these units from the other cabinets of the system and install the H9604 left expander kit in them (paragraph 9.7).
3. Arrange the cabinets in a “T” configuration (Figure 9-4) and fasten the MA780 cabinet to the CPU/SBI expander cabinet unit.
4. Remove the plenum assembly from the CPU cabinet that is to be the leg of the “T” arrangement and the CPU cabinet that does not have the left expander kit installed.



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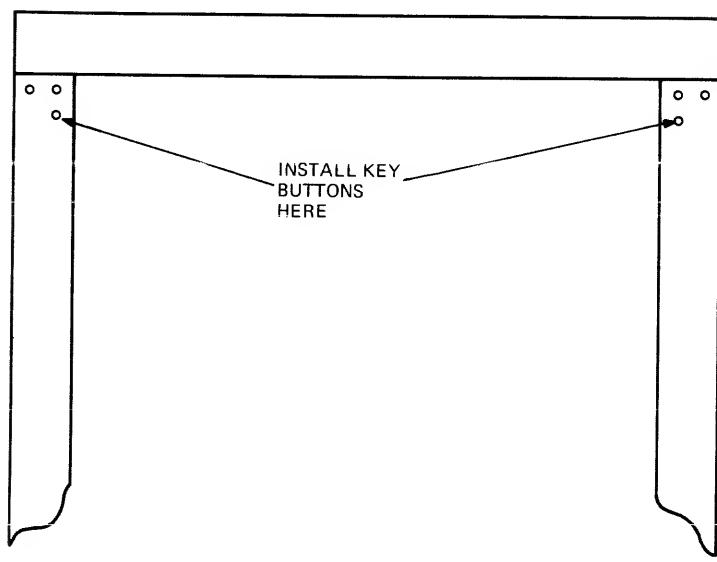
Figure 9-4 Three VAX-11/780 “T” Arrangement

5. Assemble the three CPU cabinets using the H9504-XE joiner kit. Use Engineering Drawing SA-H9504-XE-2 as a reference during the following assembly sequence. (For your convenience a perforated page of this assembly procedure is provided in an appendix to Chapter 9.)
  - a. Install vertical and top filler strips on the three CPU/SBI expander cabinet units (Figure 9-5).
  - b. Install two key buttons (Figure 9-6) on each of the two CPU/SBI expander cabinet units and MA780 cabinet that are adjacent to the H9504-XE.
  - c. Install the two vertical frame members on the CPU/SBI expander cabinet unit which is on the leg of the "T" (Figure 9-7).
  - d. Position the two cabinets that form the crossbar of the "T" arrangement to allow installation of the square frame assembly.
  - e. Fasten the two square frame assemblies to the key buttons of the crossbar cabinets (Figure 9-8). Fasten the square frame assembly to the vertical frames of the "T" leg.
  - f. Loosely mount the two top cover brackets to the top of the two square frame assemblies (Figure 9-9).
  - g. A front door is to be attached to the open side of the H9504-XE. Assemble and install the door lock to the left side of the square frame assembly (Figure 9-10).
  - h. The two front cover brackets go on the same side of the square frame assembly as the door lock. Attach the two key buttons to each of the two front cover brackets. Fasten one front cover bracket to the square frame assembly (Figure 9-11). Attach the other bracket to the bottom left of the square frame assembly.
  - i. Install the two hinge mounting brackets and the front door hinge on the right side of the front square frame assembly (Figure 9-12).
  - j. Install the pan bottom on the bottom of the frame assembly, aligning the holes in the pan plate to the screw studs on the bottom of the frames. Fasten in place with 10-32 kep nuts.
  - k. Place the top panel cover over the top cover bracket and fasten with the two locking studs. Fasten the top panel brackets to the square frame assembly, by tightening the screws placed there in step f.
  - l. Install the front door to the door hinges and adjust for a proper fit between the door, the door lock spring, and the right side of the cabinet.
  - m. Install the front panel cover over the front cover brackets and make sure of a proper fit between the cabinet and the front door.



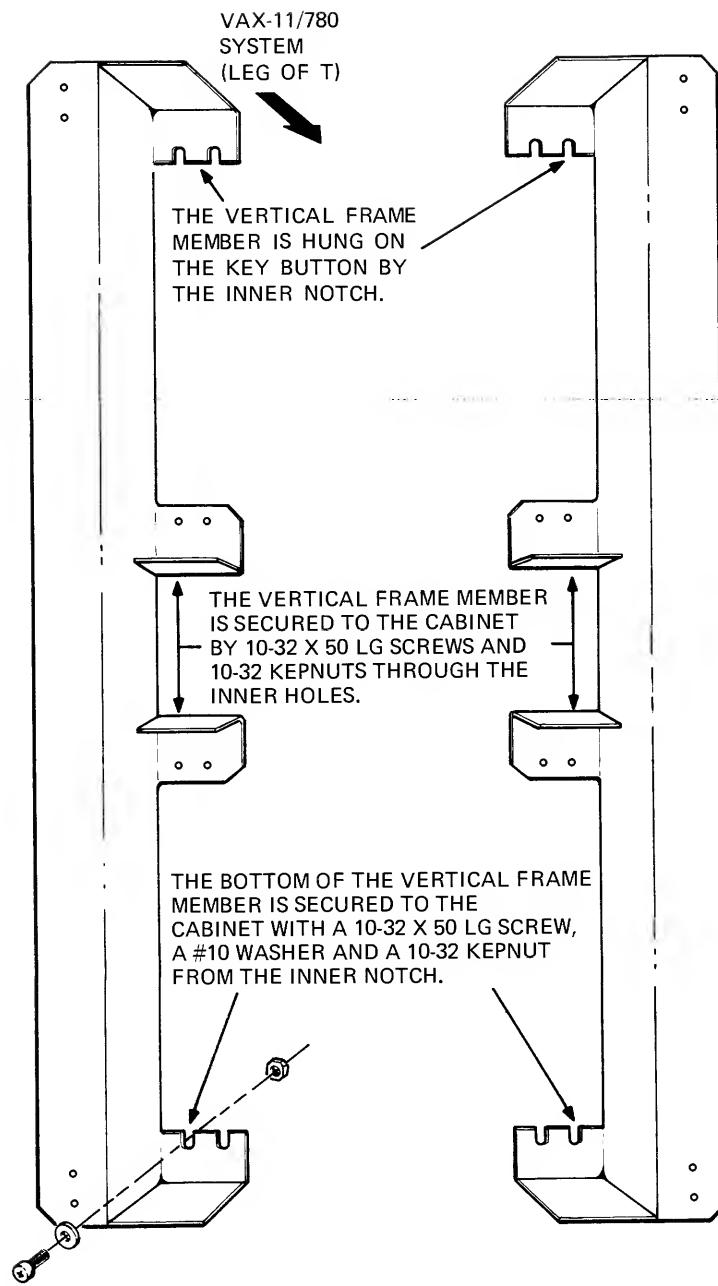
TK-7191

Figure 9-5 H9504-XE Filler Strip Installation



TK-7198

Figure 9-6 H9504-XE Key Button Installation



TK-7203

Figure 9-7 H9504-XE Vertical Frame Member Installation

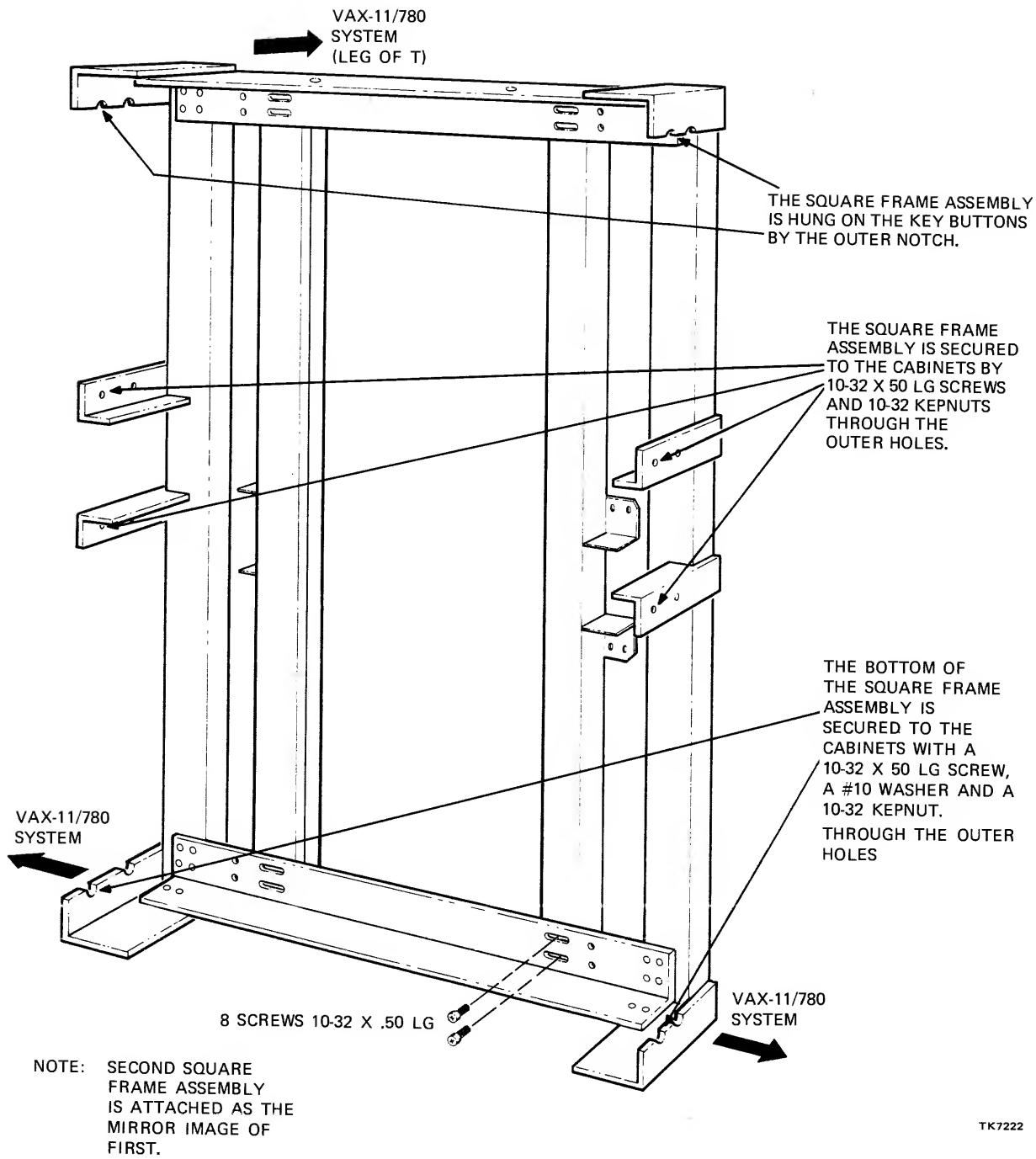
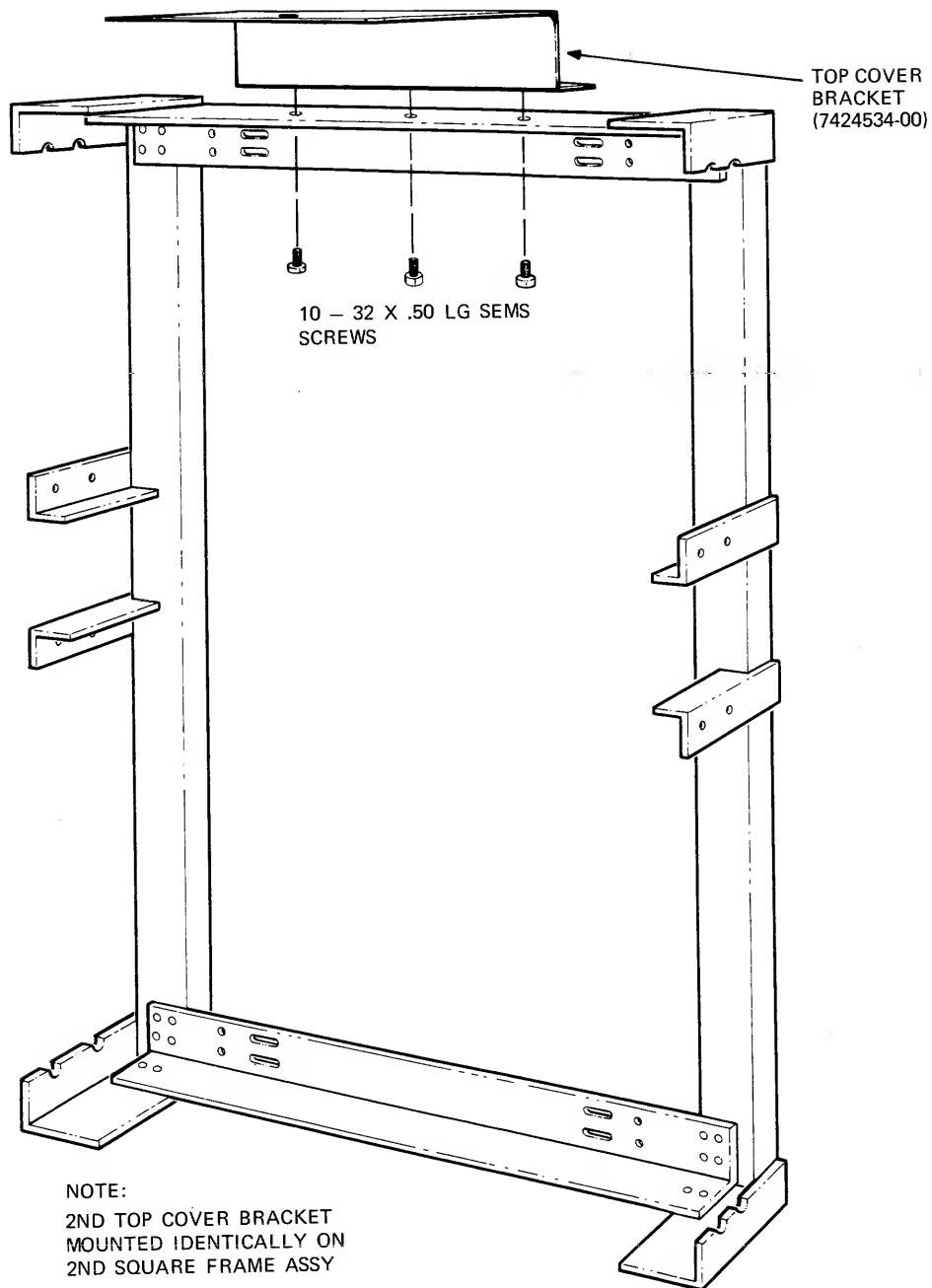


Figure 9-8 H9504-XE Square Frame Assembly Installation



TK-7213

Figure 9-9 H9504-XE Top Cover Bracket Installation

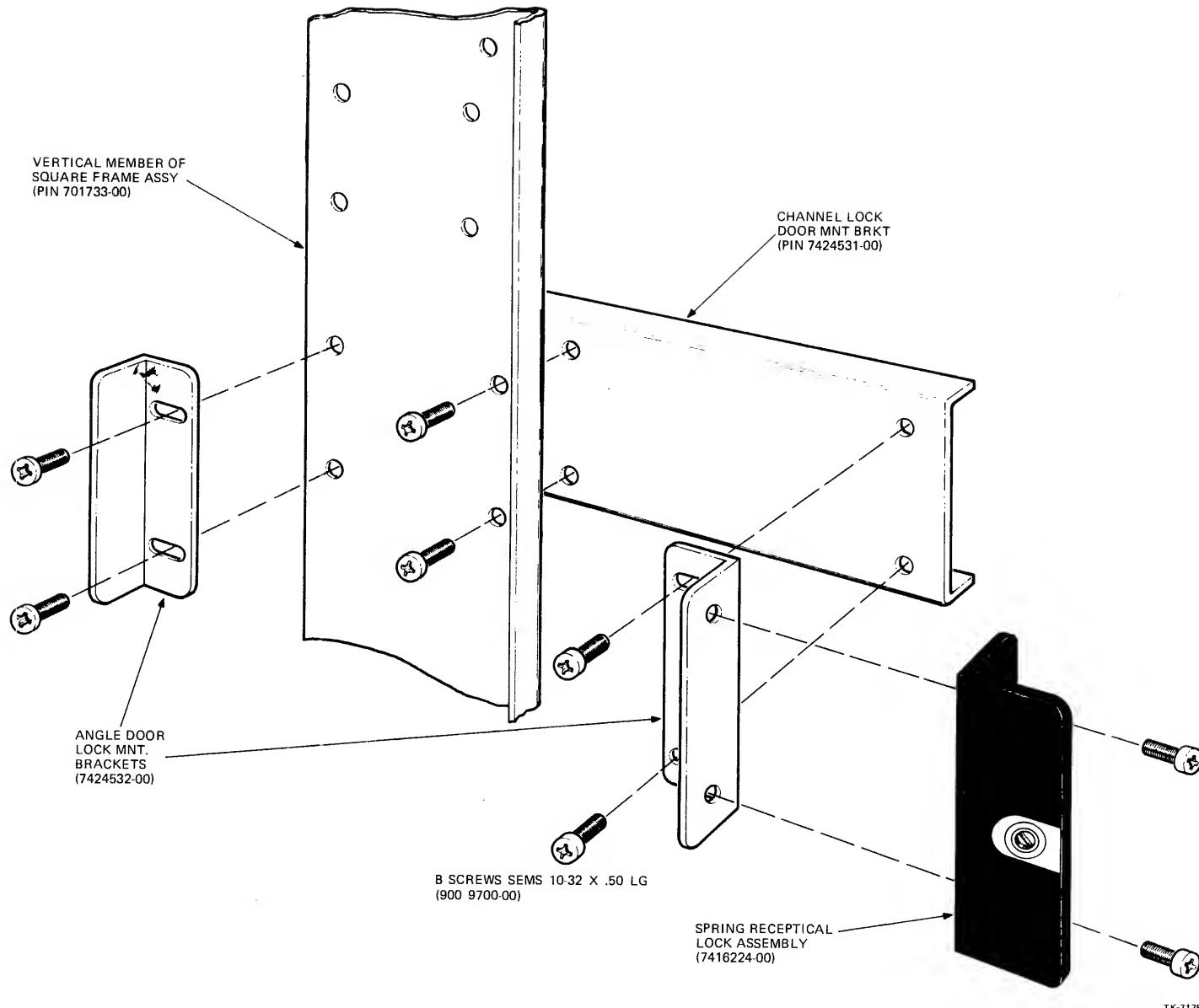


Figure 9-10 H9504-XE Door Locking Bracket Installation

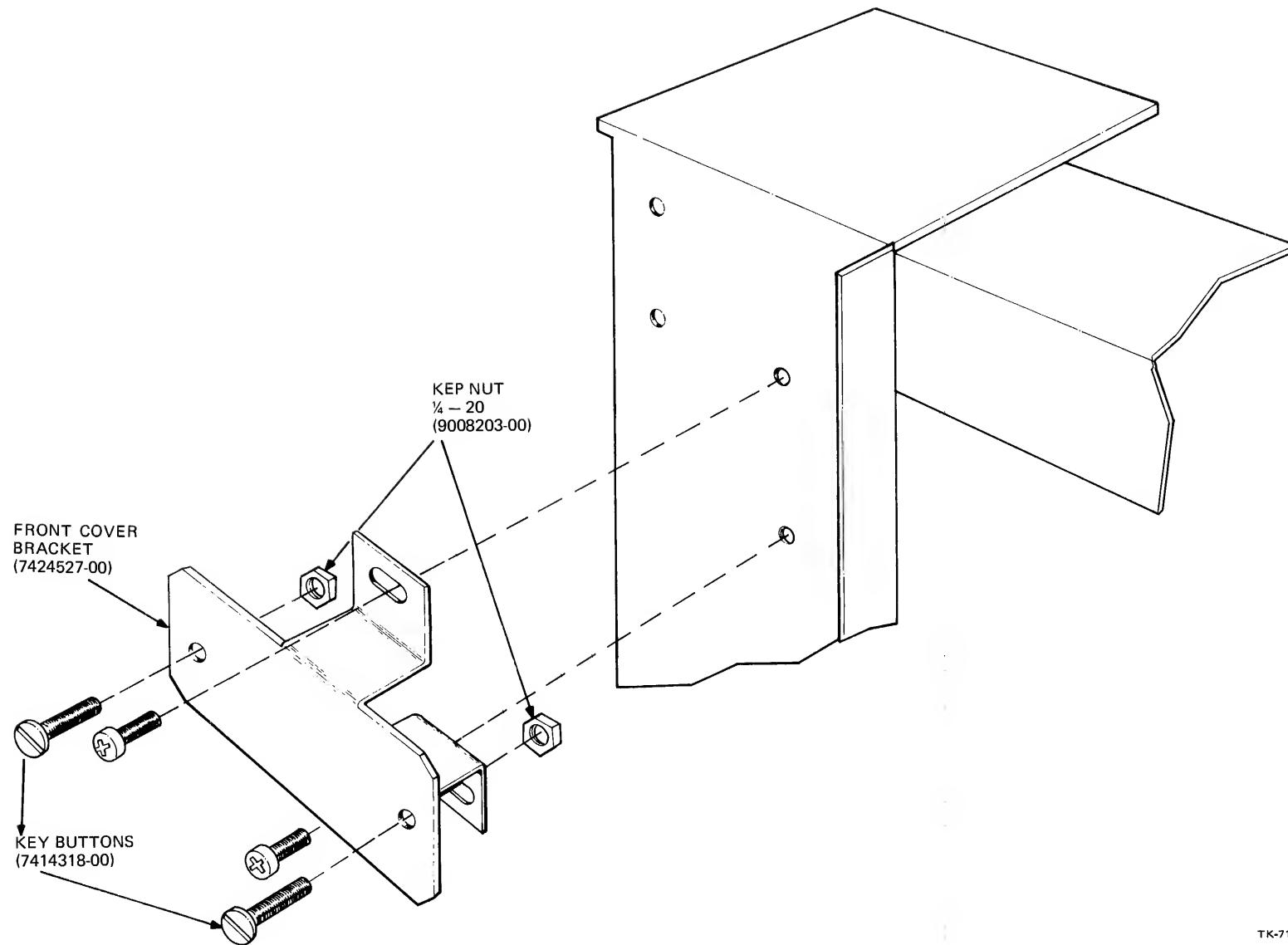


Figure 9-11 H9504-XE Front Cover Bracket Installation

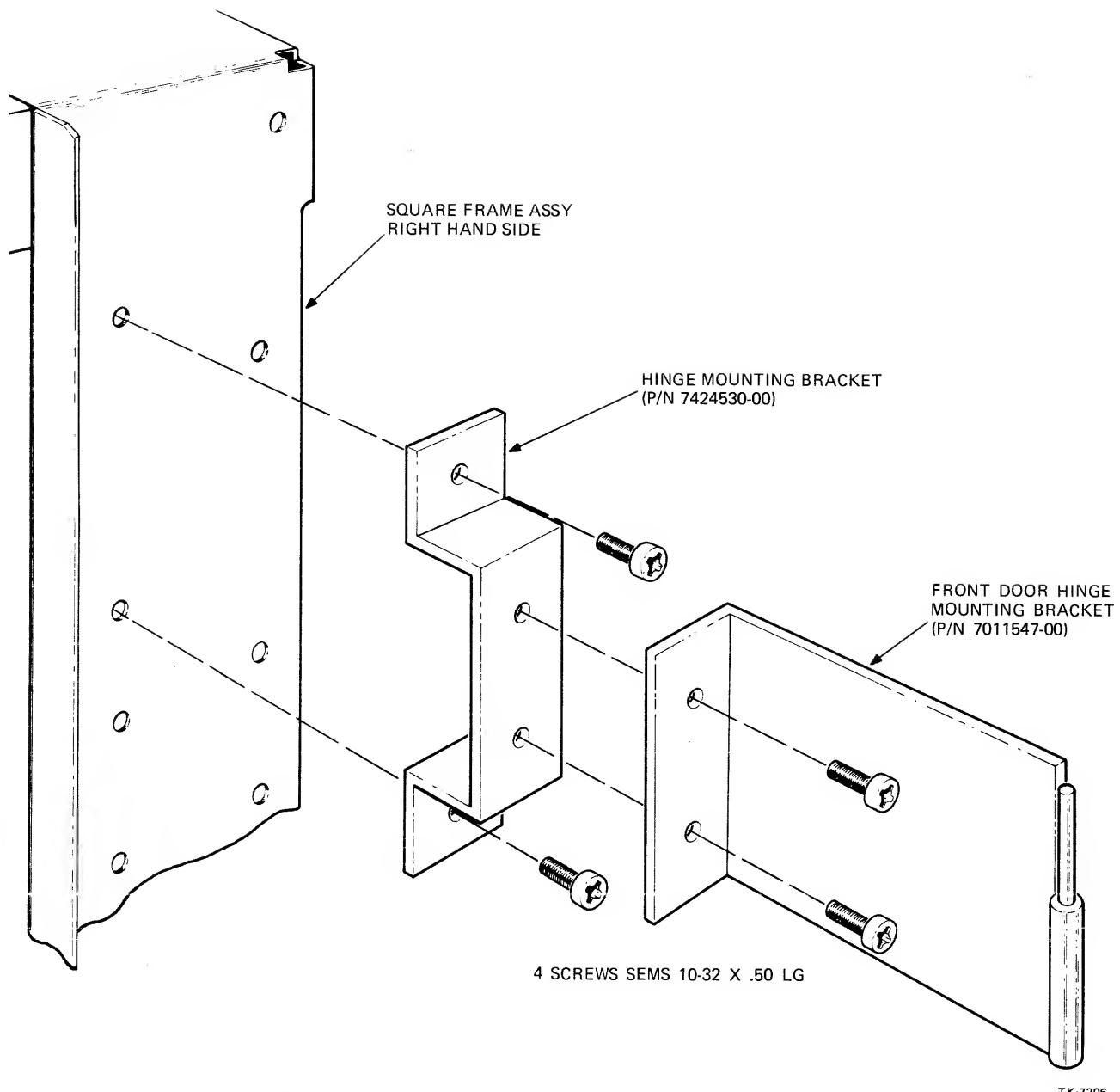


Figure 9-12 H9504-XE Front Door Hinge Installation

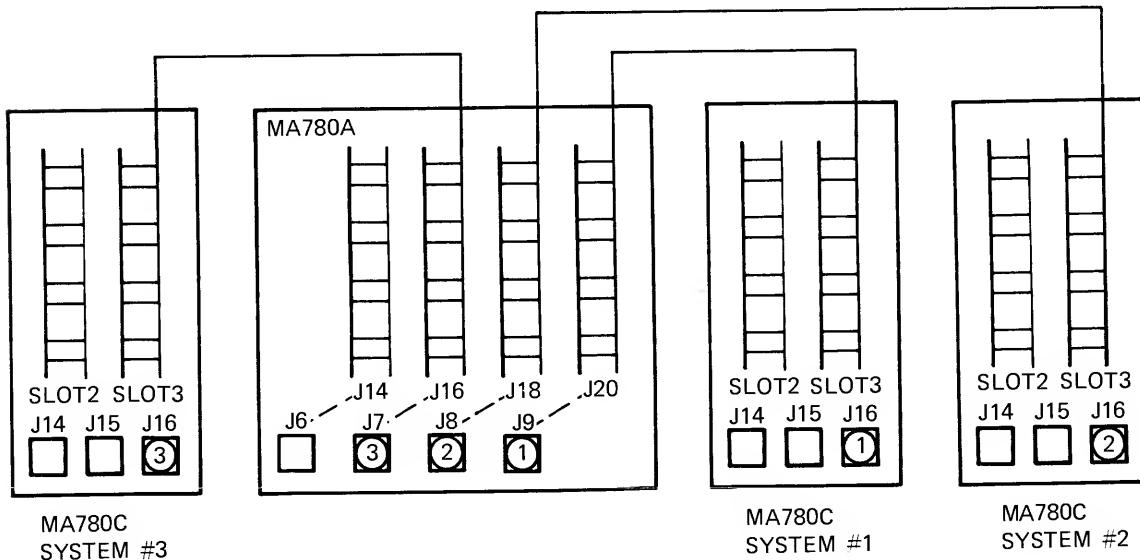
TK-7206

6. Assemble and install the two new plenum assemblies on the CPU cabinet located on the leg of the "T" configuration and the CPU cabinet which does not have the left expansion kit installed.
  - a. Remove the plenum panel from the original plenum assembly by taking the 20 nuts from the plenum panel studs.
  - b. Fasten the new plenum assembly (P/N 7018124-00) to the plenum assembly using the 6-32 nuts provided.

**NOTE**

**When installing the new plenum panel assembly onto the system make sure the louvers of the plenum assembly are facing the rest of the system cabinets (Figure 9-4).**

- c. Install the modified plenum assembly in the CPU cabinet.
7. Install an MA780C backplane assembly in each CPU (or SBI expander) cabinet (paragraph 9.2.1).
8. Install the BDI cables from the MA780C backplane in the CPU cabinets to the MA780A backplane; refer to paragraph 9.3.2.1 and Figure 9-13. Use MA780A slots J20, J18, and J16 for corresponding MA780A ports 0, 1, and 2.
9. Connect the cables to and from the CPU, SBI expander cabinet, tape units and UNIBUS expander cabinets.



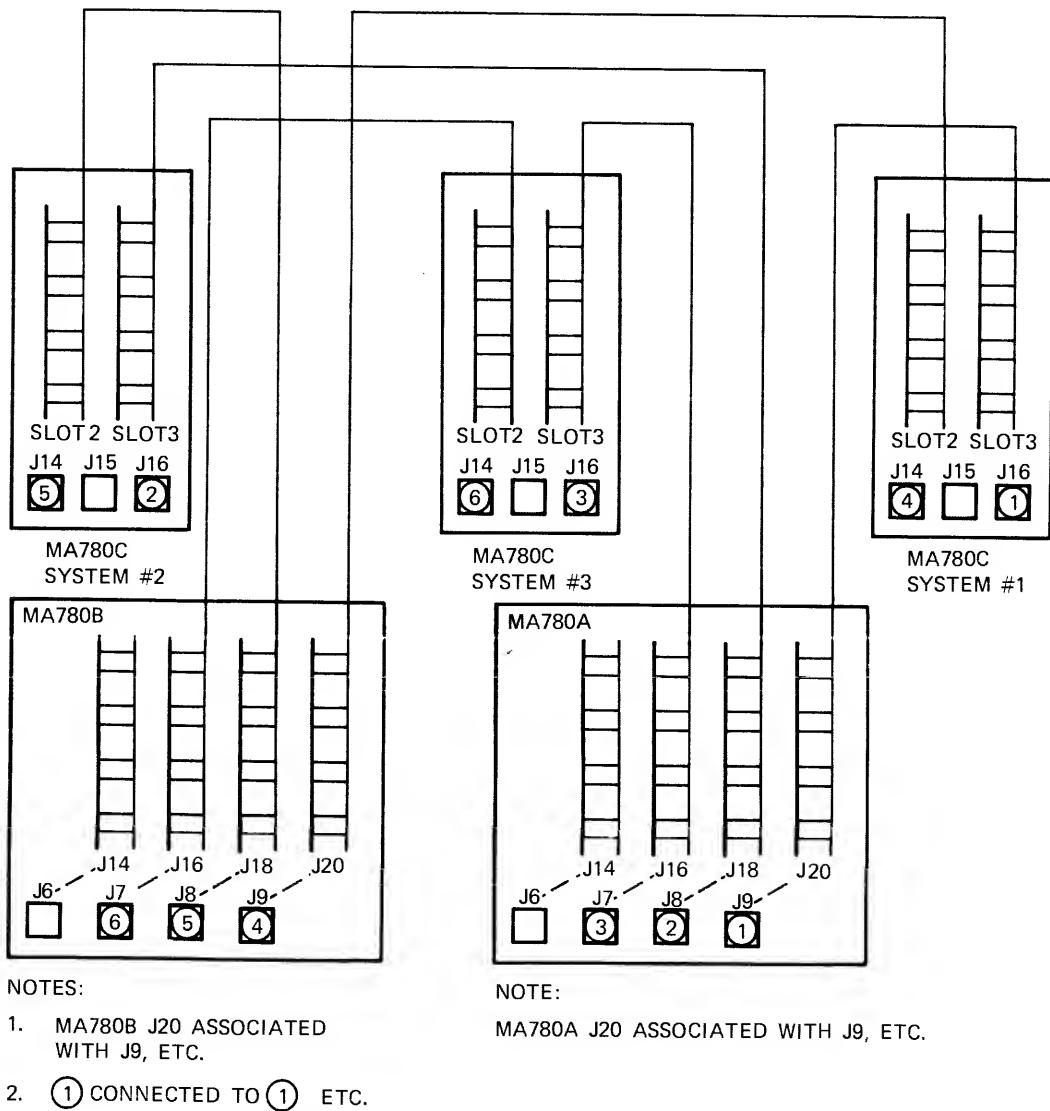
NOTES: 1. MA780A J20 ASSOCIATED WITH J9, ETC.  
2. (1) CONNECTS TO (1) ETC.

TK-7431

Figure 9-13 Three-System BDI Cable Routing

**9.1.2.2 MA780A and MA780B** – This installation needs three VAX-11/780 systems, an MA780A multiport memory, an MA780B multiport memory, an H9604 left expander kit, and an MA780F option. The following describes the installation procedure for a three VAX-11/780 system with two MA780 multiport memories in a “T” arrangement.

1. Perform steps 1 through 7 of paragraph 9.1.2.1.
2. Install the MA780B option in the MA780 cabinet (paragraph 9.4).
3. Install the BDI cables from the three MA780C backplanes in the CPU cabinets to the MA780A and MA780B backplanes as directed in paragraph 9.3.2.1 (Figure 9-14). Use MA780A and MA780B slots J20, J18, and J16 for the corresponding MA780A/B ports 0, 1, and 2.
4. Connect the cables to and from the CPU, SBI expander cabinet, tape units and UNIBUS expander cabinets.



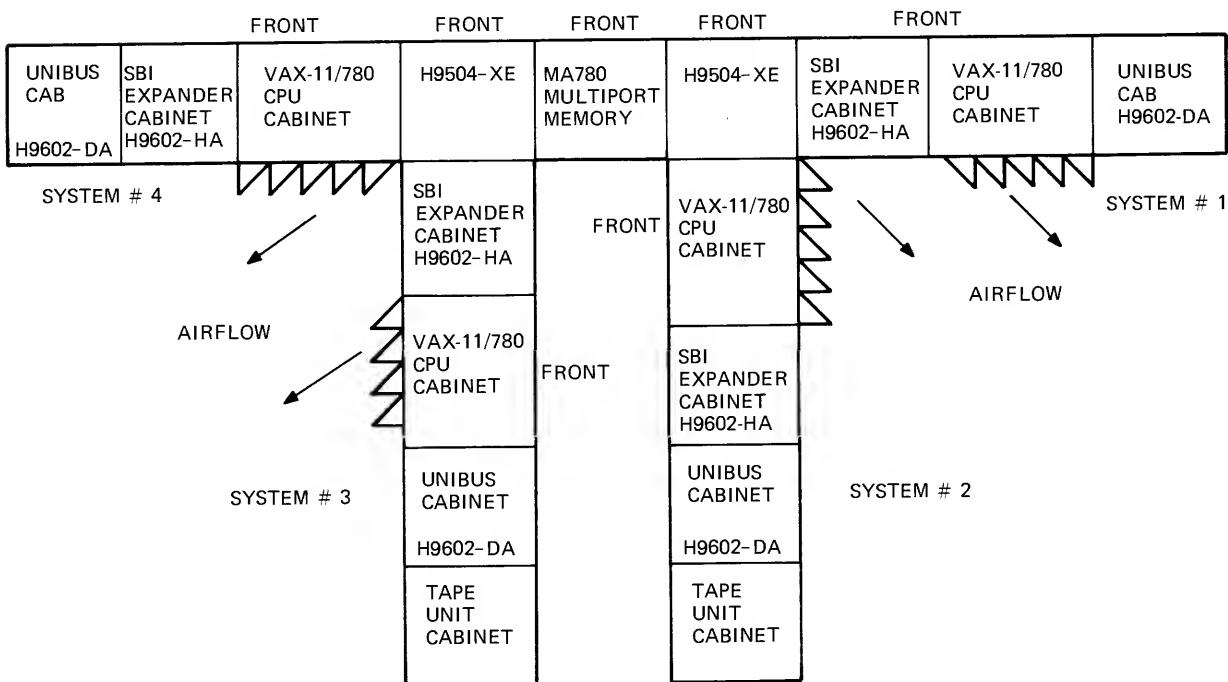
TK-7434

Figure 9-14 Three-System BDI Cable Routing with MA780A and MA780B

### 9.1.3 Four-System MA780 Configuration

**9.1.3.1 MA780A** – This installation requires four VAX-11/780 systems, an MA780A multiport memory, and two MA780F options. The following procedure is used to place four VAX-11/780 CPUs in a “pi” configuration with a single multiport memory.

1. Halt and power down the four systems. Set the main circuit breaker on the power controllers of all systems to OFF and remove all ac connections to the systems.
2. Two of the four systems must be arranged to expand to the left for the “pi” configuration. These two systems are number 1 and number 3 (Figure 9-15). Disconnect all cables going to and from these two CPU/SBI expander units. Disassemble these units from the other cabinets of their system and install the H9604 left expander kit in them (paragraph 9.7).
3. Remove the plenum assemblies from all four CPU cabinets.
4. Arrange one system, one CPU/SBI expander cabinet unit, and the MA780 cabinet in a “T” arrangement (Figure 9-15). This “T” contains system 1, system 2, and the MA780 cabinet.
5. Assemble the two CPU/SBI expander cabinet units (systems 1 and 2) and the MA780 cabinet using the H9504-XE joiner kit. Use engineering drawing SA-H9504-XE-2 as a reference during the following assembly procedure.
  - a. Install vertical and top filler strips on the two CPU/SBI expander cabinet units and the MA780 cabinet (Figure 9-5).
  - b. Install two key buttons on each of the two CPU/SBI expander cabinet units and the MA780 cabinet (Figure 9-6).



TK-7211

Figure 9-15 Four VAX-11/780 Systems in a “pi” Configuration

- c. Install the two vertical frame members on the CPU/SBI expander cabinet unit on the leg of the "T" (Figure 9-7).
- d. Position the MA780 cabinet and the CPU/SBI expander cabinet unit (system 1) so that they form the crossbar of the "T" arrangement.
- e. Fasten the two square frame assemblies to the key buttons of the crossbar cabinets (Figure 9-8). Fasten the square frame assembly to the vertical frames of the "T" leg.
- f. Loosely mount the two top cover brackets to the top of the two square frame assemblies (Figure 9-9).
- g. Assemble and install the door lock device on the left side of the square frame assembly of the H9504-XE (Figure 9-10).
- h. The two front cover brackets go on the same side of the square frame assembly as the door lock. Attach the two key buttons to each of the two front cover brackets. Fasten one front cover bracket to the square frame assembly (Figure 9-11). Attach the other bracket to the bottom left of the square frame assembly.
- i. Install the two hinge mounting brackets and the front door hinge on the right side of the front square frame assembly (Figure 9-12).
- j. Install the pan bottom on the bottom of the frame assembly, aligning the holes in the pan plate to the screw studs on the bottom of the frames. Fasten in place with 10-32 kep nuts.
- k. Place the top panel cover over the top cover brackets and fasten with the two locking studs. Fasten the top panel brackets to the square frame assembly, by tightening the screws placed there in step f.
- l. Install the front door to the door hinges and adjust for a proper fit between the door, the door lock spring, and the right side of the cabinet.
- m. Install the front panel cover over the rear cover brackets and make sure of a proper fit between the cabinet and the front door.

6. Assemble the other two CPU/SBI expander cabinet units (systems 3 and 4) and the MA780 cabinet (Figure 9-15) using the second H9504-XE joiner kit. Follow the procedure given in step 5.

7. Assemble and install the new plenum assemblies in the four CPU cabinets.

- a. Remove the plenum panels from the original plenum assemblies by taking the 20 nuts from the studs of each plenum panel.
- b. Fasten the new plenum assemblies (P/N 7018124-00) to the plenum assemblies using the 6-32 nuts provided.

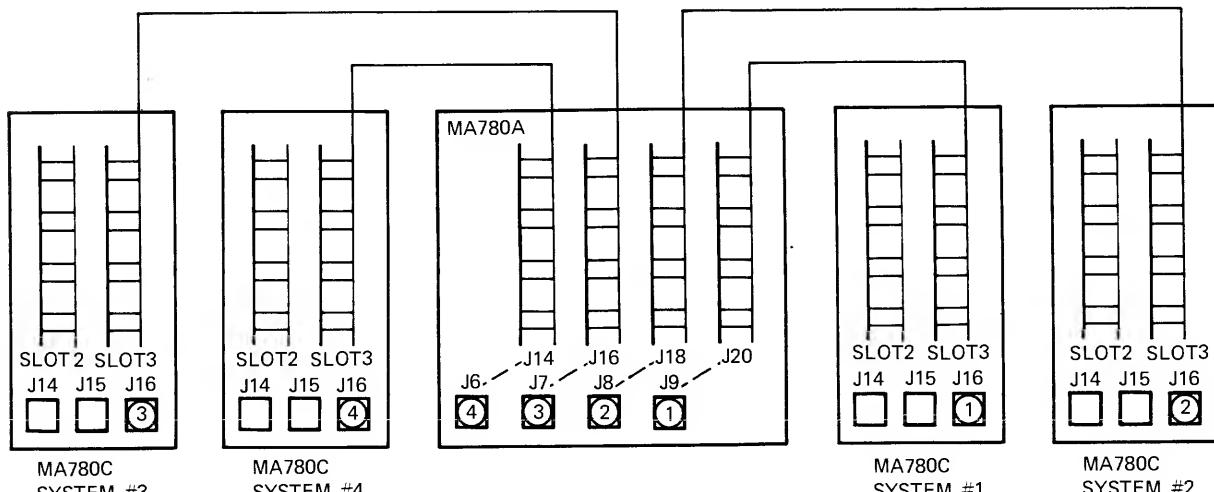
#### **NOTE**

**When installing the new plenum panel assembly onto the system make sure the louvers of the plenum assembly are facing the rest of the system cabinets (Figure 9-15).**

8. Install an MA780C backplane assembly in each CPU (or SBI expander) cabinet (paragraph 9.2.1).
9. Install the BDI cables from the MA780C backplane in the CPU cabinets to the MA780A backplane; refer to paragraph 9.3.2.1 and Figure 9-16. Use MA780A slots J20, J18, J16 and J14 for corresponding MA780A ports 0, 1, 2, and 3.
10. Connect the cables to and from the CPU, SBI expander cabinet, tape units and UNIBUS expander cabinets.

**9.1.3.2 MA780A and MA780B** – This installation requires four VAX-11/780 systems, an MA780A multiport memory, an MA780B multiport memory, and two MA780F options. The following procedure is used to place four VAX-11/780 CPUs in a “pi” configuration with two multiport memories.

1. Perform steps 1 through 8 of paragraph 9.1.3.1.
2. Install the MA780B option as directed in paragraph 9.4.
3. Install the BDI cables from the MA780C backplane in the CPU cabinets to the MA780A backplane; refer to paragraph 9.3.2.1 and Figure 9-17. Use MA780A/B slots J20, J18, J16 and J14 for corresponding MA780A/B ports 0, 1, 2, and 3.
4. Connect the cables to and from the CPU, SBI expander cabinet, tape units and UNIBUS expander cabinets.



NOTES:

1. MA780A J20 ASSOCIATED WITH J9, ETC.
2. (1) CONNECTS TO (1) ETC.

TK-7432

Figure 9-16 Four-System BDI Cable Routing with MA780A

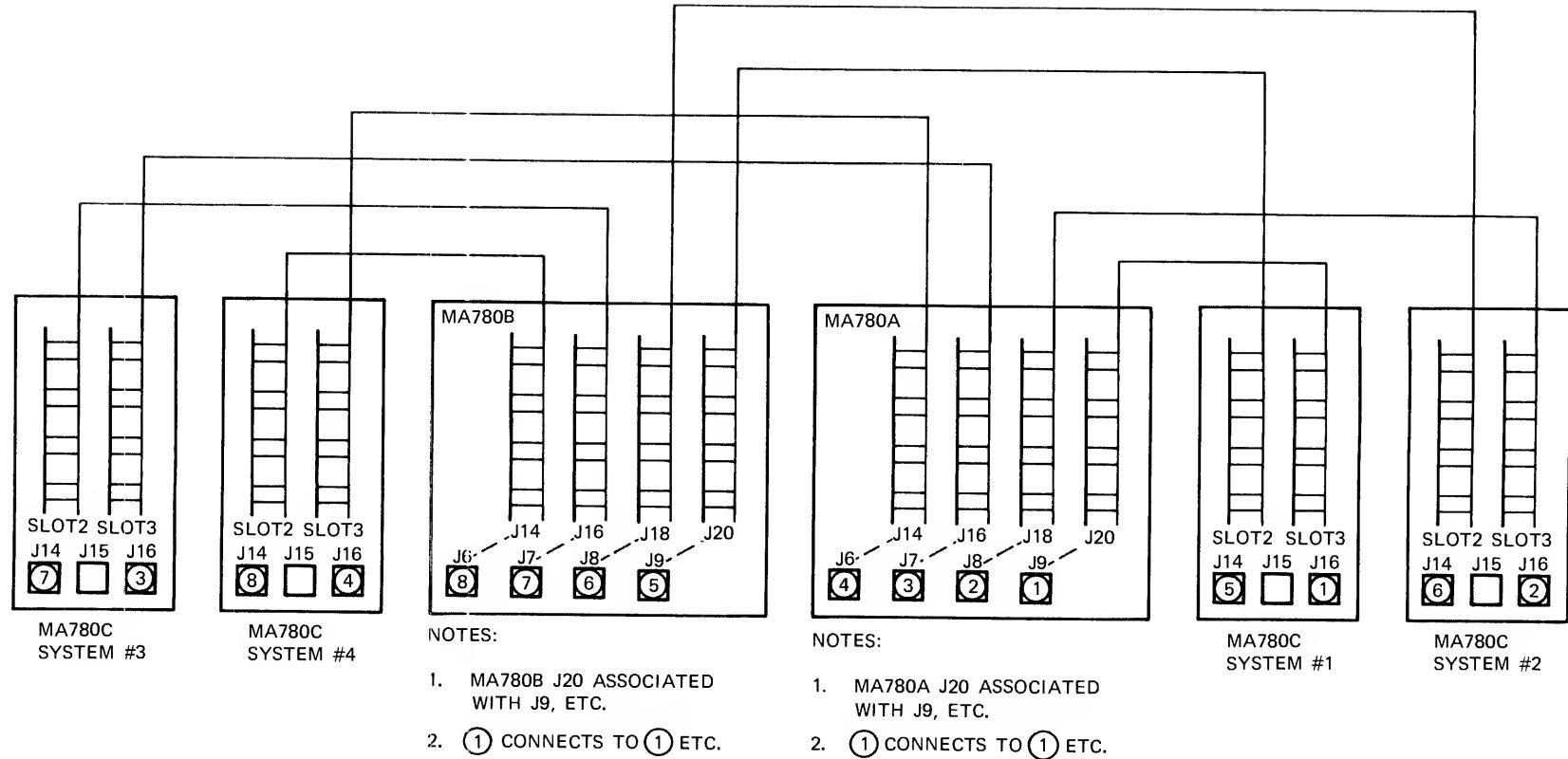


Figure 9-17 Four-System BDI Cable Routing with MA780A and MA780B

## 9.2 THE MA780C PORT INTERFACE ASSEMBLY

The MA780C port interface assembly is the port interconnect between the MA780A/B and the synchronous backplane interconnect (SBI) of the VAX-11/780 system. The MA780C can be installed on the SBI in several ways.

- The MA780C can be installed in the 3 1/4-inch slot which usually has the SFT (M9043). The SFT is removed and the MA780 installed. The MA780C can then use slot 3 for a port, and slot 2 for the M9040 board, which is an SBI terminator. If both slots 3 and 2 in the MA780C are used for ports, then the SBI is continued into the SBI expander cabinet where the SFT is installed to terminate the SBI.
- The MA780C can be installed in the SBI expander cabinet if space is not available in the CPU cabinet. Whether one or two ports are used, the M9043 SFT is always used to terminate the SBI in the SBI expander cabinet.
- If two MA780Cs are installed on one SBI, one is usually in the CPU cabinet, the other in the SBI expander cabinet. Both can be in the SBI expander cabinet if desired. They should be adjacent to each other on the SBI due to the relatively short (15-inch) mark interlock cable.

The following paragraphs describe the installation of the MA780C interface assembly including power cabling and jumper configurations. Connecting the BDI and power cables from the MA780C to the MA780A/B is described in paragraph 9.3.2.1.

### CAUTION

**The MA780C usually uses the MS780 +5 Volts.  
The MS780 uses an unswitched ac power source.  
Thus when the CPU cabinet is shut down using the  
key, the MS780 and the MA780C still have +5  
Volts applied to them.**

### 9.2.1 Installation

The following paragraph describes the installation of the MA780C interface assembly in the main CPU cabinet and/or the SBI expander cabinet.

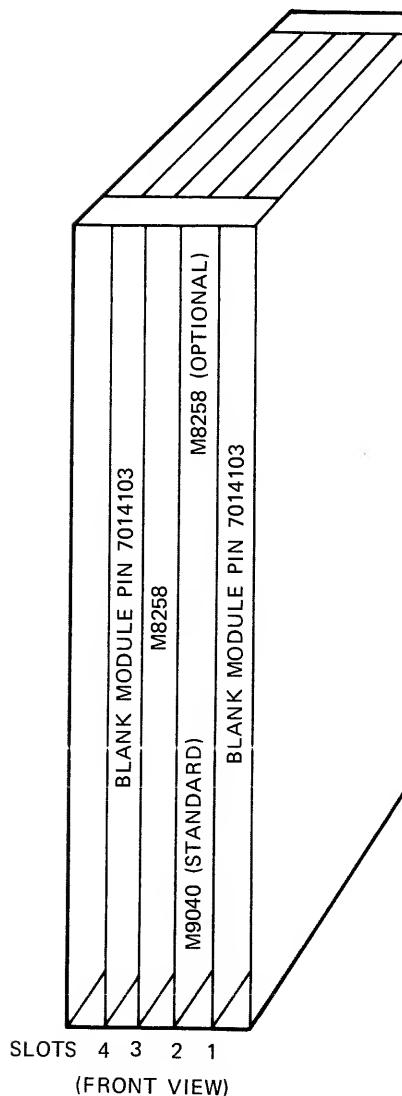
### NOTE

**If installation includes two MA780C backplanes on  
one SBI, they should be adjacent on the SBI due to  
the short (15-inch) interlock cable provided.**

**All systems should be powered off at this time.**

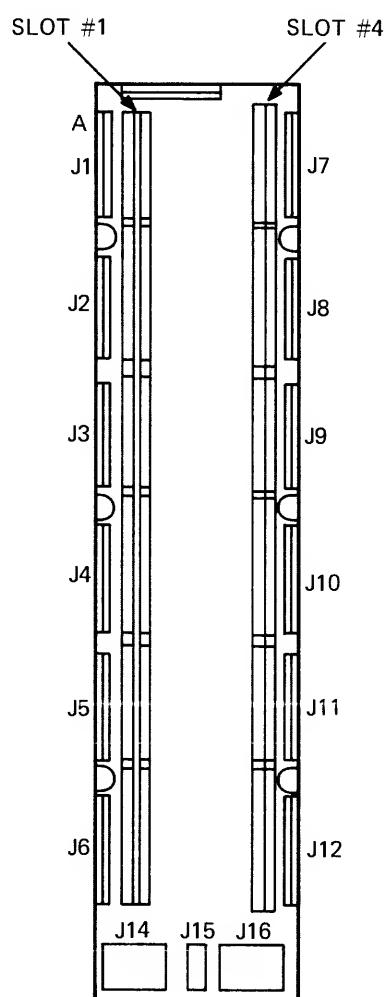
1. Remove the M9043 SBI terminator assembly from the system as directed in paragraph 9.9.
2. Install the MA780C port interface backplane assembly in the location where the SBI terminator assembly was.
  - a. From the back of the system, slide the MA780C backplane assembly into the slot made available by the removal of the SBI terminator.
  - b. Fasten the MA780C assembly to the back of the card cage, at the top of the unit, with the two screws and star washers supplied.
  - c. Fasten the front of the MA780C assembly to the card cage, at the bottom of the unit, by installing the two screws and star washers supplied.

3. Install the M8258 (MPI) board(s) (Figure 9-18) into:
  - a. Slot 3 for a one-port installation
  - b. Slot 3 and 2 for a two-port installation
4. Install two blank modules (P/N 7014103) into slots 1 and 4 of the MA780C.
5. Install the SBI terminator (M9040 or M9043) as directed in paragraph 9.9.
6. Install the M9045 paddle cards and the BDI cables in J1 and J4; refer to paragraph 9.3.2.1 and Figure 9-19.



TK-7207

Figure 9-18 MA780C Front View



TK-7209

Figure 9-19 MA780C Back View

### 9.2.2 MA780C Power Cable Installation

MA780C power connections may change depending on the number of ports connected to one SBI. The following paragraphs show the connections for a single port and for two ports on the SBI. The differences that occur when the MA780C is installed in the SBI expander cabinet are noted.

#### CAUTION

**J15 on MA780C (mark interlock) should only be connected to J15 of another MA780C.**

#### 9.2.2.1 One SBI Port – Installation of the MA780C power cables (P/N 7016885-00 and 7016884-00) is done from the back of the MA780C assembly (Figures 9-20 and 9-22).

1. Make the following connection using the power cable unit (P/N 7016885-00).
  - a. Connect P1 to J16 of the MA780C backplane.
  - b. Remove P3 (–5.2 volts and ground) from the previous option backplane. Connect P3 to J7. Connect J6 to the option backplane where P3 was.
  - c. Connect the red wire with a lug attached, to the +5 volt side of the MS780 power supply. Connect the black wire with a lug attached, to the ground side of the MS780 power supply.
  - d. Connect plug J4 to J20 of the MS780 backplane.
  - e. Connect J3 to J3 of the MS power supply.
  - f. Plug J5 is installed in the MA780 cabinet. The wires attached to J5 run along the BDI cable to the MA780. Installation of the BDI cable and the connection of J5 are described in paragraph 9.3.2.1, step 4.
2. If the SBI is terminated by the M90043 SFT in the SBI cabinet, the cable (P/N 7016884-0) is excess material. If the SBI is terminated at the MA780C backplane by the M9040, then make the following connections using the power cable unit (P/N 7016884-0).
  - a. When the SFT was removed three connectors were left unconnected.
  - b. J1, J2 and J3 plug into connectors J1, J2 and J3 respectively of the SFT cable.
3. The mark interlock cable is excess material (it is only used if there are two MA780C backplanes on one SPI).

#### 9.2.2.2 Two SBI Ports – Installation of the MA780C power cable using the two ports on the MA780C is similar to the installation using one port (Figures 9-21 and 9-22).

1. Install cable (P/N 7016885-00); refer to paragraph 9.2.2.1.
2. Install cable (P/N 7016885-00, identical cable) at J14 of the MA780C.
3. The SBI cannot terminate at an MA780C which uses both ports; it must go on to the M9043 SFT or to the next SBI device.
4. The excess material includes:
  - 1 MA780C backplane
  - 2 cables (P/N 7016884-00)
  - 2 mark interlock cables

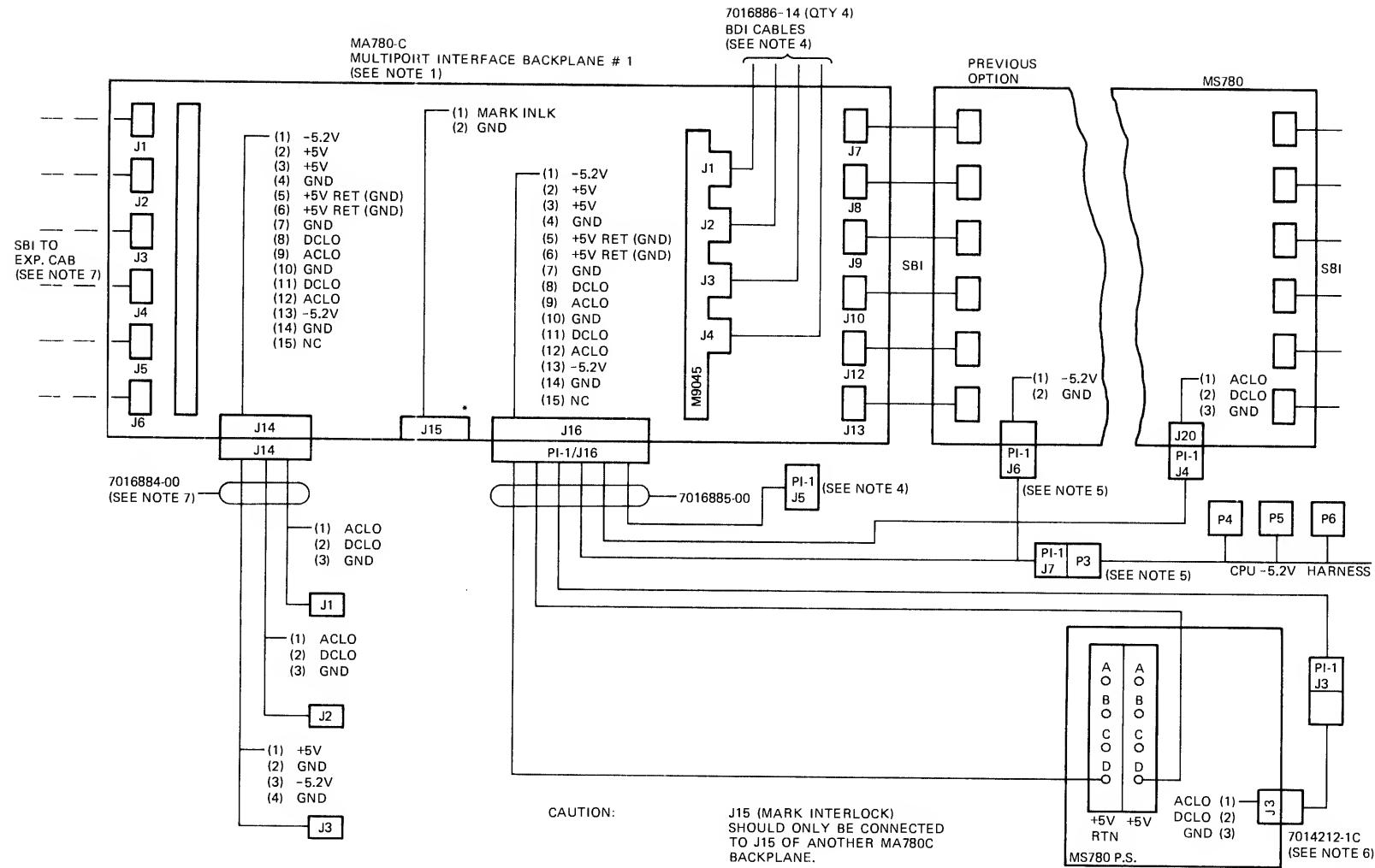


Figure 9-20 MA780C Power Cables with One Port

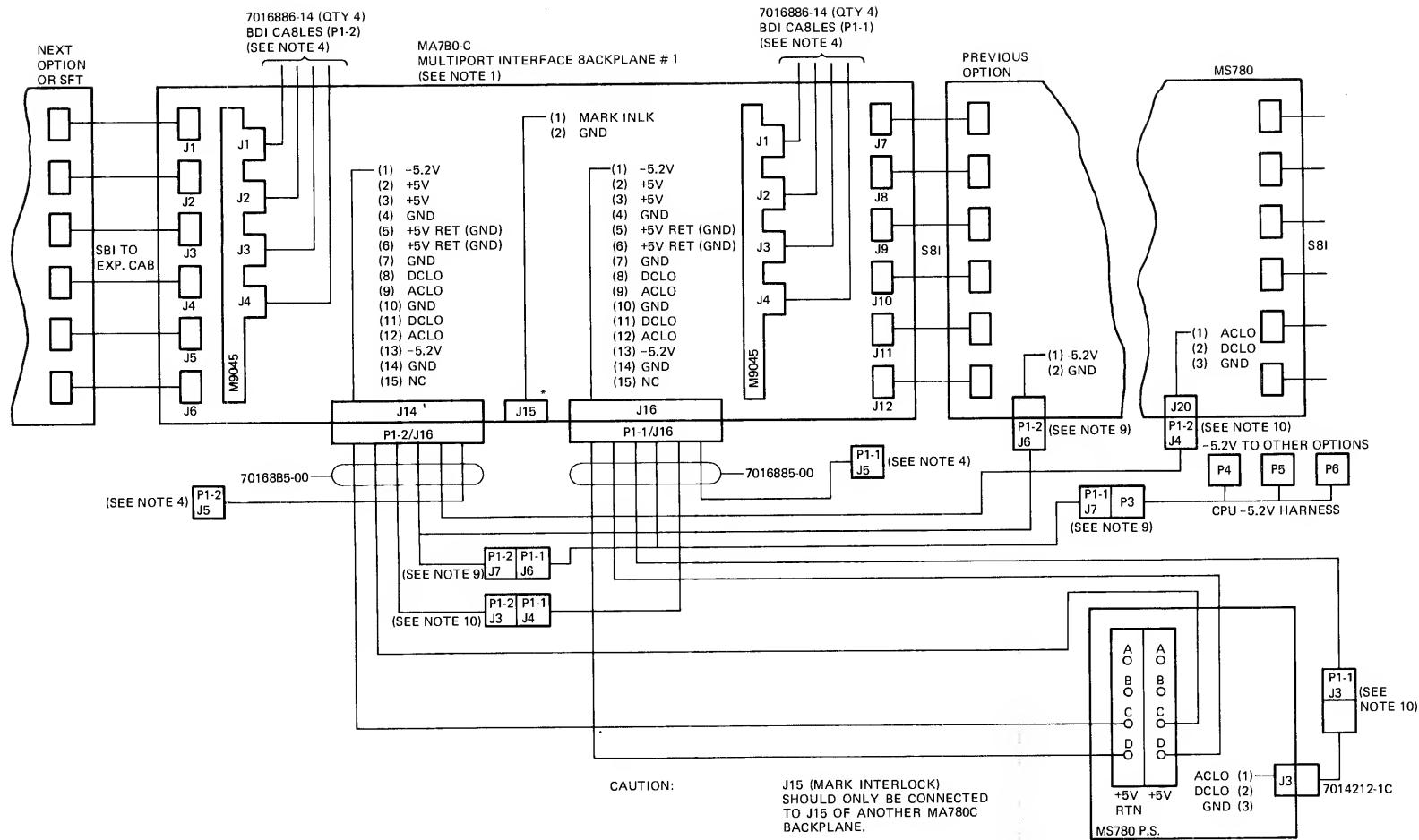


Figure 9-21 MA780C Power Cables with Two Ports

TABLE 1 (1 PORT ON SBI)

PART NUMBER	DESCRIPTION	FIRST PORT (MA780-C BP # 1)			REMARKS	SBI TERMINATION (MA780-C BP MUST BE THE LAST DEVICE ON THE SBI)				
		FROM/WITH	TO	PART NUMBER		FROM/WITH	TO	REMARKS		
7016BB5-00 (1 REQ)	MPI POWER HARNESS	PI-1 (J16)/RED WIRES	MS780 P.S./+5V-D	+5V		7016884-00	TRM POWER ADAPTER	J14/J1	CPU AC, DCLO HARNESS	CPU AC, DCLO
		PI-1 (J16)/BLK WIRES	MS780 P.S./+5V RTN-D	+5V RTN(GND)				J14/J2	CPU AC, DCLO HARNESS	CPU AC, DCLO
		PI-1 (J16)/J3	MS780 P.S./J3(7014212-1C)	AC, DCLO				J14/J3	CPU ±5V HARNESS/P7	CPU ±5V
		PI-1 (J16)/J4	MS780 BP/J20	AC, DCLO						
		PI-1 (J16)/J5	MA780 BP/APPROPRIATE -5.2V CONN. FOR PORT	-5.2V						
		PI-1 (J16)/J6	LAST OPTION -5.2V CONN. OR NO CONNECTION	-5.2V						
		PI-1 (J16)/J7	CPU -5.2V HARNESS/P3	-5.2V						

TABLE 2 (2 PORTS ON SBI)

PART NUMBER	DESCRIPTION	FIRST PORT (MA780-C BP # 1)			SECOND PORT (MA780-C BP # 1)			REMARKS
		FROM/WITH	TO	FROM/WITH	TO	REMARKS		
7016BB5-00 (2 REQ)	MPI POWER HARNESS	PI-1 (J16)/RED WIRES	MS780 P.S./+5V-D	PI-2 (J16)/RED WIRES	MS780 P.S./+5V-C	+5V		
		PI-1 (J16)/BLK WIRES	MS780 P.S./+5V RTN-D	PI-2 (J16)/BLK WIRES	MS780 P.S./+5V RTN-C	+5V RTN (GND)		
		PI-1 (J16)/J3	MS780 P.S./J3(7014212-1C)	PI-2 (J16)/J3	PI-1/J4	AC, DCLO		
		PI-1 (J16)/J4	MS780 BP/J20	PI-2 (J16)/J4	AC, DCLO			
		PI-1 (J16)/J5	MA780 BP/APPROPRIATE -5.2V CONN. FOR PORT	PI-2 (J16)/J5	MA780 BP/APPROPRIATE -5.2V CONN. FOR PORT	-5.2V		
		PI-1 (J16)/J6	PI-2/J7	PI-2 (J16)/J6	LAST OPTION -5.2V CONN. OR NO CONNECTION	-5.2V		
		PI-1 (J16)/J7	CPU -5.2V HARNESS/P3	PI-2 (J16)/J7	—	-5.2V		

## NOTES:

1. THE MA780-C OPTION INTERCONNECT DRAWINGS REPRESENT THE TYPICAL POWER CONNECTIONS OF FROM ONE TO FOUR PORTS ON A SINGLE SBI. TYPICALLY THE FIRST MA780-C BACKPLANE WILL REPLACE THE SFT (SBI TERMINATOR) IN THE CPU CABINET. IF TWO OR MORE PORTS ARE INSTALLED ON THE SAME SBI, A CPU EXPANDER CABINET IS REQUIRED AND THE SFT WILL TERMINATE THE SBI IN THE EXPANDER CABINET. IF TWO MA780-C BACKPLANES ARE REQUIRED (3 OR 4 PORTS ON ONE SBI) THE SECOND BACKPLANE WILL TYPICALLY MOUNT IN THE LAST 4 INCH OPTION SLOT IN THE CPU CABINET (NEXT TO THE FIRST MA780-C BACKPLANE).
2. IF FUTURE CONFIGURATIONS OR SPECIAL CUSTOMER REQUIREMENTS PREVENT A TYPICAL INSTALLATION, THE FOLLOWING PRECAUTIONS MUST BE OBSERVED:
  - A. IF MOUNTED IN AN EXPANDER CABINET, THE MA780-C BACKPLANE MUST OCCUPY A 4 INCH OPTION SLOT (CANNOT REPLACE THE SFT).
  - B. IF TWO MA780-C BACKPLANES ARE REQUIRED, THEY MUST OCCUPY ADJACENT OPTION SLOTS.
  - C. NO MORE THAN TWO PORTS MAY DERIVE THEIR POWER FROM AN MS780 OR RH780 POWER SUPPLY (ALL FOUR PORTS MAY DERIVE THEIR POWER FROM A SINGLE DEDICATED SUPPLY).
  - D. EACH PORT MUST BE CONNECTED TO THE ACLO OCLO SIGNALS FROM THE POWER SUPPLY FROM WHICH IT DERIVES ITS POWER.
  - E. EACH PORT MUST BE CONNECTED TO THE CPU -5.2V HARNESS.
  - F. CONFIGURATION GUIDELINES FOR OTHER OPTIONS MUST ALSO BE OBSERVED.
3. ALSO REFER TO FROM/TO TABLES ON THIS SHEET.
4. BOI CABLES (7016886-14) AND -5.2V CABLE (J5 OF 7016885-00) CONNECT TO THE MULTIPORT MEMORY BACKPLANE. REFER TO THE MULTI-SYSTEMS CONFIGURATION ILLUSTRATIONS WHICH DETAIL CABLE ROUTING AND CONNECTIONS.
5. IN THE CPU CABINET THERE IS A -5.2V HARNESS (SEE FIGURE 9-20) WITH A NUMBER OF PIGTAILS EXTENDING FROM IT. PI-1/J7 WILL CONNECT TO THE LAST CONNECTOR IN THE HARNESS (P3). IF P3 IS NOT FREE THEN DISCONNECT IT FROM THE PREVIOUS OPTION BACKPLANE.
6. THERE IS AN AC, DCLO CABLE (7014212-1C) THAT RUNS BETWEEN J20 OF THE MS780 BACKPLANE AND J3 OF THE MS780 POWER SUPPLY. DISCONNECT THE CABLE AT J20 ON THE BACKPLANE. CONNECT PI-1/J4 OF 7016885-00 INTO J20 AND PI-1/J3 OF 7016885-00 INTO THE LOOSE END OF THE AC, DCLO CABLE CONNECTED TO THE MS780 POWER SUPPLY.
7. IF THIS MA780-C IS THE LAST DEVICE ON THE SBI, THERE WILL BE THREE CONNECTORS FREEED UP AFTER THE SFT IS REMOVED TO ACCOMMODATE THIS DEVICE. THESE CONNECTORS WILL CONNECT TO J1, J2 AND J3 OF 7016884-00. IF THIS MA780-C IS NOT THE LAST DEVICE ON THE SBI, CABLE 7016BB4-00 IS NOT CONNECTED AND THE M9040 MODULE MUST NOT BE PRESENT IN SLOT 2 OF THIS BACKPLANE.
8. IN THIS CONFIGURATION THE SFT IS USED TO TERMINATE THE SBI AND IS LOCATED IN THE CPU EXPANDER CABINET. THE M9040 (TRM) MODULES MUST NOT BE PRESENT IN EITHER MA780-C.
9. THE CPU -5.2V IS PROPAGATED AS IN NOTES EXCEPT THAT PI-1/J6 IS CONNECTED TO PI-2/J7 AND PI-2/J6 TO THE PREVIOUS OPTION BACKPLANE (OR NOT USED IF THE LAST CPU OPTION SLOT IS NOT USED).
10. THE AC, OCLO SIGNALS ARE PROPAGATED AS IN NOTE 6 EXCEPT THAT PI-1/J4 IS CONNECTED TO PI-2/J3 AND PI-2/J4 IS CONNECTED TO J20 OF THE MS780 BACKPLANE.
11. THE SECONDO MA780-C BACKPLANE IS MOUNTED IN THE LAST CPU OPTION SLOT. IF AN OPTION IS ALREADY IN THAT SLOT IT MUST BE MOVED TO THE SBI EXPANDER CABINET. THE M9040 (TRM) MODULE MUST BE REMOVED FROM THE MA780-C BACKPLANE.
12. THE MARK INLK CABLE MUST BE CONNECTED BETWEEN J15 OF THE FIRST MA780-C BACKPLANE AND J15 OF THE SECONDO MA780-C BACKPLANE.
13. THE CPU -5.2V IS PROPAGATED AS IN NOTES 5 AND 9 EXCEPT THAT PI-2/J6 IS CONNECTED TO PI-3/J7 AND PI-3/J6 IS NOT USED.
14. THE AC, DCLO SIGNALS FOR THIS PORT ARE DERIVED FROM THE MA780-E POWER SUPPLY (PI-3/J4 TO P.S. J3). PI-3/J3 IS NOT USED.
15. THE CPU -5.2V IS PROPAGATED BY CONNECTING PI-3/J6 TO PI-4/J7. PI-4/J6 IS NOT USED.
16. THE AC, DCLO SIGNALS ARE PROPAGATED BY CONNECTING PI-3/J3 TO PI-4/J4. PI-4/J3 IS NOT USED.

TK-7174

Figure 9-22 One and Two Ports on SBI

### 9.2.3 Installing the Jumpers on the MA780C

1. The MA780C jumpers are inserted in J13 which is located at the top back of the MA780C backplane. The arrangement of J13, looking at the pin side of backplane follows:

W20	W19	W18	W17	W16	—	—	—	W5	W4	W3	W2	W1
o	o	o	o	o	—	—	—	o	o	o	o	o
o	o	o	o	o	—	—	—	o	o	o	o	o

2. The memory that contains the ROM boot strap must be at TR1. The standard MA780 port usually has TR level 2 on the SBI. If two MS780 memories are on the system and are to be interleaved, the second MS780 must be at the next higher even TR number past the last MA780 TR.
  - a. SBI TR level jumpers for standard port interface using slots 3(MPI) and 4(M9045 BDI paddle card).

TR Level	Jumpers				Wire Wrap F03H1 to
	W4	W3	W2	W1	
1	—	—	—	—	F03C1
2	—	—	—	I	F03D1*
3	—	—	I	—	F03E1
4	—	—	I	I	F03F2
5	—	I	—	—	F03H2
6	—	I	—	I	F03J1
7	—	I	I	—	F03J2
8	—	I	I	I	F03M1
9	I	—	—	—	F03N1
10	I	—	—	I	F03P1
11	I	—	I	—	F03P2
12	I	—	I	I	F03S2
13	I	I	—	—	F03T2
14	I	I	—	I	F03U1
15	I	I	I	—	F03U2

I = Jumper inserted

— = No jumper

\* = Standard configuration

b. SBI TR level jumpers for standard port interface using slots 2(MPI) and 1(M9045 BDI paddle card).

TR Level	Jumpers				Wire Wrap F02H1 to
	W20	W19	W18	W17	
1	—	—	—	—	F02C1
2	I	—	—	—	F02D1
3	—	I	—	—	F02E1*
4	I	I	—	—	F02F2
5	—	—	I	—	F02H2
6	I	—	I	—	F02J1
7	—	I	I	—	F02J2
8	I	I	I	—	F02M1
9	—	—	—	I	F02N1
10	I	—	—	I	F02P1
11	—	I	—	I	F02P2
12	I	I	—	I	F02S2
13	—	—	I	I	F02T2
14	I	—	I	I	F02U1
15	—	I	I	I	F02U2

I = Jumper inserted

— = No jumper

\* = Standard configuration

4. Install the interrupt level jumper.

Interport Interrupt Level	Error Interrupt Level	Standard Port Slots 3 & 4 W5	Optional Port Slots 1 & 2 W16
4	5	—	—*
6	7	I	I

I = Jumper inserted

— = No jumper

\* = Standard configuration

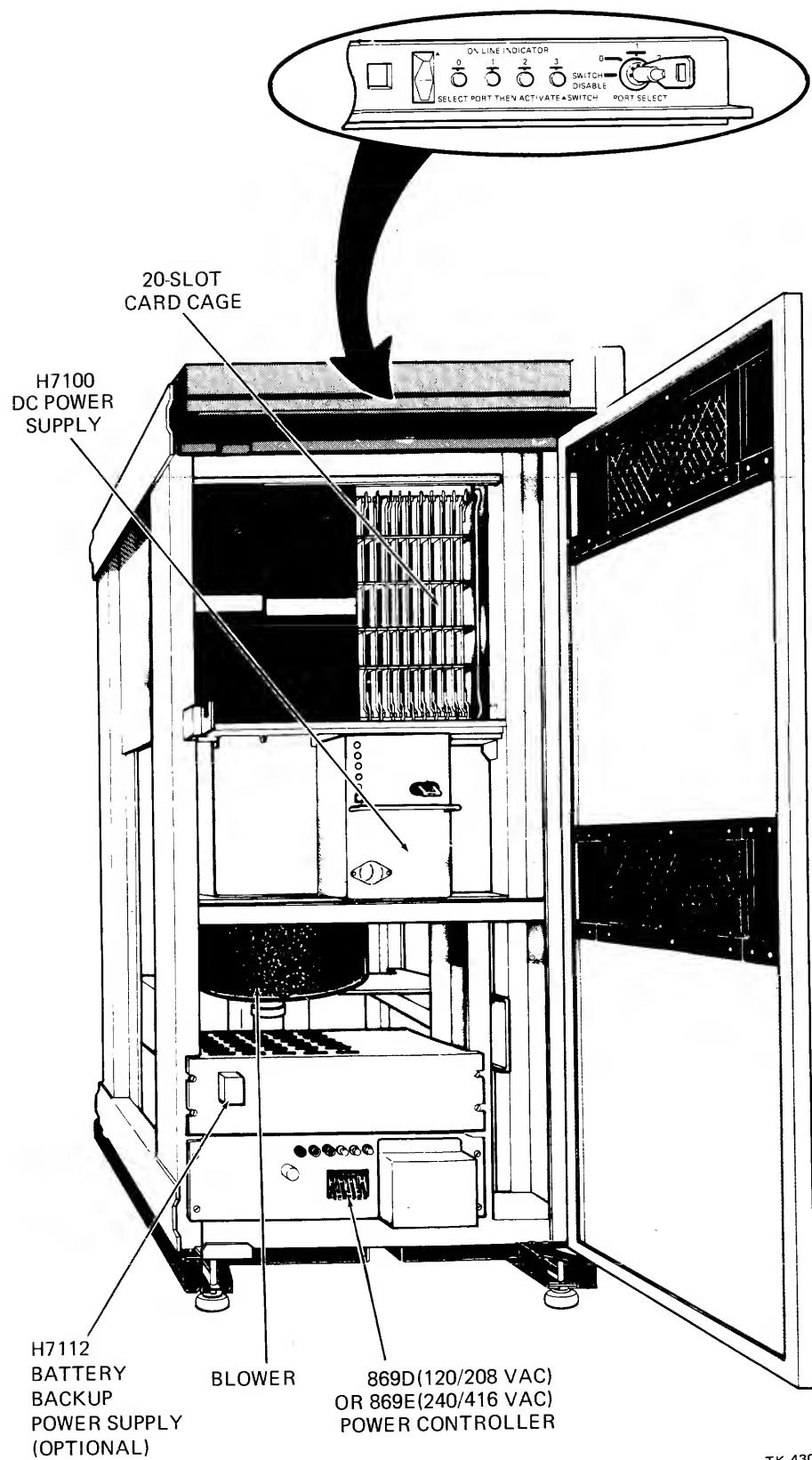
### 9.3 MA780A OPTION

The MA780A option consists of a modified highboy (H9602) corporate cabinet with one MA780 multi-port memory unit, a memory power supply, an 869 power controller, and an optional H7112A/B battery backup unit. Two (or more) VAX-11/780 CPUs can communicate with each other via ports into the memory. The memory power supply can be:

P/N 70-14957-00 60 Hz  
P/N 70-14957-00 50 Hz

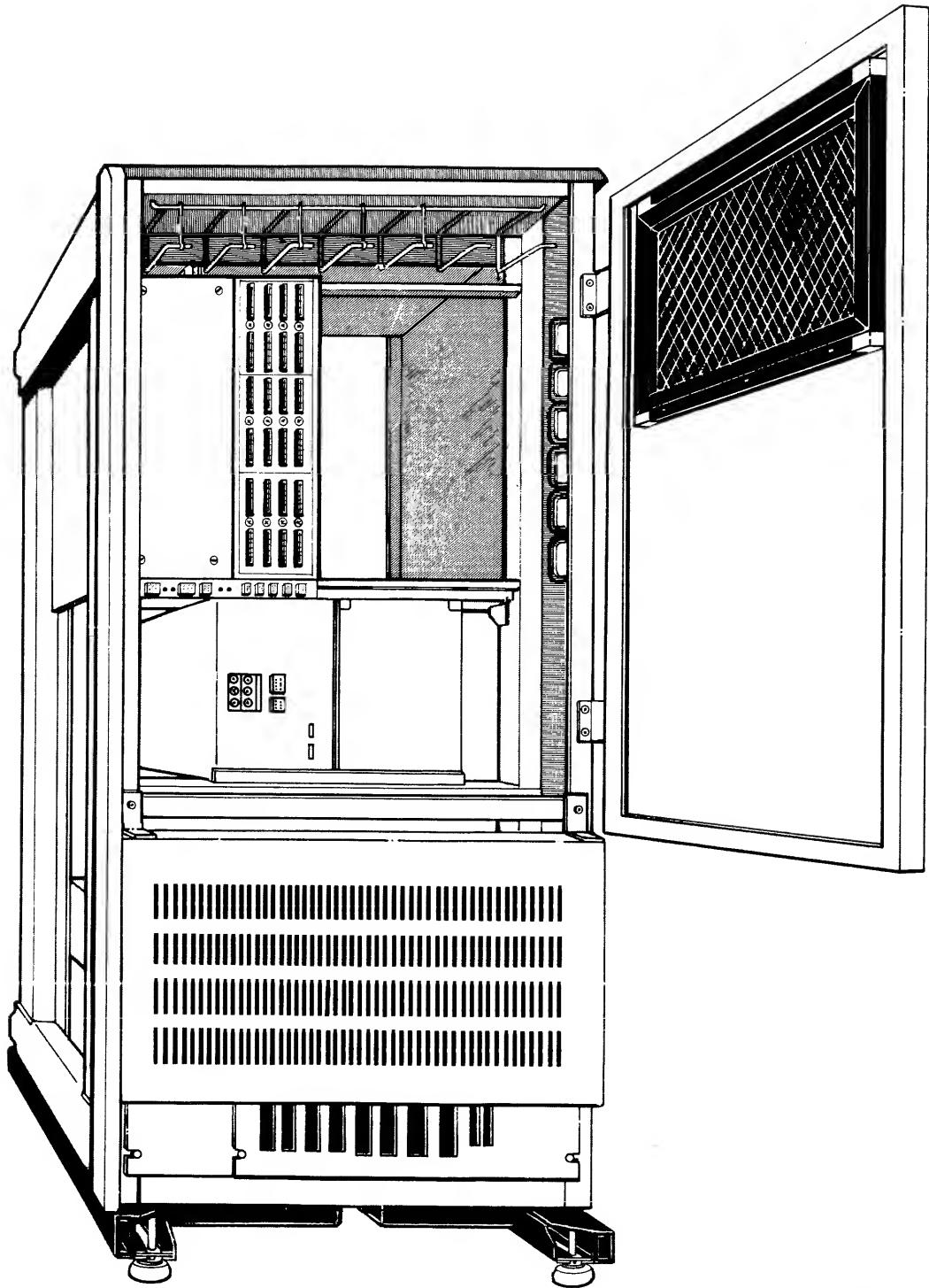
#### 9.3.1 Physical Layout

The physical arrangement of the MA780 cabinet is shown in Figures 9-23 and 9-24.



TK-4305

Figure 9-23 MA780 Multiport Memory Cabinet (Front View)



TK-3276

Figure 9-24 MA780 Multiport Memory Cabinet (Back View)

### 9.3.2 Installation

Installation of the MA780A option is the joining of two or more VAX-11/780 CPUs together with a multiport memory. The following paragraphs describe the cabling and jumper options used in any configuration. Refer to paragraph 9.1 for information specific to a particular two, three, or four VAX-11/780 system configuration.

#### 9.3.2.1 Bidirectional Data Interconnect Cable Installation -

1. From the back, install the M9045 BDI paddle cards in slots J20, J18, J16, and J14 (pin side) of the MA780A/B backplane as needed (Figure 9-24). The connectors on the BDI board M9045 should be to the right.

J20	MA780A/B port 0
J18	MA780A/B port 1
J16	MA780A/B port 2
J14	MA780A/B port 3

2. From the back, install the M9045 BDI paddle cards in slots 4 and 1 (pin side) of the MA780C backplanes as needed (Figure 9-19). The connectors on the BDI board M9045 should be to the right.

Slot 4, first MA780C on SBI	SBI port 0
Slot 1, first MA780C on SBI	SBI port 1
Slot 4, second MA780C on SBI	SBI port 2
Slot 1, second MA780C on SBI	SBI port 3

3. Install the BDI cable (P/N 7016886-14) from the MA780Cs, located in the main CPU or SBI expander cabinets, to the MA780A/B backplane.
  - a. Plug connectors J1 through J4 of the BDI cable into the corresponding MA780C M9045 paddle card connectors J1 through J4. The red edge of the cable should point up and connect to pin 1 of the paddle card connectors.
  - b. Route the BDI cable to the MA780 cabinet, through the MA780 cable trough to the MA780A/B backplane. Use the cable connection diagram for the configuration being installed. (The BDI cable loops back in the same direction it came from. This enables the slack to be taken up in the lower cable trough.)
  - c. Plug connectors J1 through J4 of the BDI cable into the corresponding MA780A/B M9045 paddle card connectors J1 through J4. The red edge of the cable should point up and connect to pin 1 of the paddle card connectors.
4. Connect the -5.2 volt and ground supplied by the MA780C to the MA780A/B receiving slot. This power is carried from either J16 or J14 on the MA780C via J5 of the MA780C wiring harness to one of J9, J8, J7, or J6 on the MA780A/B backplane. The wiring attached to J5 follows the route of the corresponding BDI cable. Refer to BDI cable figures for connections.

#### MA780 Configuration

Two VAX-11/780 Systems in line	Figures 9-2,9-3
Three VAX-11/780 Systems in "T"	Figure 9-13
Three VAX-11/780 Systems in "T" (Dual MA780s)	Figure 9-14
Four VAX-11/780 Systems in "pi"	Figure 9-16
Four VAX-11/780 Systems in "pi" (Dual MA780s)	Figure 9-17

#### BDI Cable Figure

### 9.3.2.2 MA780A Jumper Installation –

1. Insert the MA780A/B jumpers into J16 at the top back of the MA780 backplane. The arrangement of J16, looking at pin side of backplane is as follows.

W1	W2	W3	W4	W5	W6	W7	–	–	–	–	W17	W18	W19	W20
o	o	o	o	o	o	o	–	–	–	–	o	o	o	o
o	o	o	o	o	o	o	–	–	–	–	o	o	o	o

2. The MA780A/B is assigned a number from 0 to 3. The number assigned is displayed on the MA780A/B control panel. Jumpers W1 and W2 select the number.

Number	W1	W2
0	I	I*
1	I	–
2	–	I
3	–	–

I = Jumper inserted  
 – = No jumper  
 \* = Standard configuration

3. Ports 0 through 3 of the MA780A/B each have a starting address which is loaded at powerup. Eight jumpers select the power-up starting address for the four ports as follows:

Power-up Starting Address	Port 0		Port 1		Port 2		Port 3	
	W19	W20	W15	W16	W11	W12	W7	W8
0 MB	I	I	I	I	I	I	I	I
48 MB	–	–	–	–	–	–	–	–*
32 MB	–	I	–	I	–	I	–	I
16 MB	I	–	I	–	I	–	I	–

I = Jumper inserted  
 – = No jumper  
 \* = Standard configuration

#### 9.4 MA780B OPTION

The MA780B option is an addition to the MA780A option (Figure 9-25). This option contains:

- MA780 Card Cage with boards
- MA780C Interconnect Units (2)
- Memory Power Supply
  - P/N 70-14957-00 60 Hz
  - or P/N 70-14957-01 50 Hz
- H7112A/B Battery Backup (optional)
- Power Harness
- Signal Cables
- MA780 Control Panel and Control Panel Extrusion

The MA780B multiport memory option is installed in the MA780 cabinet which already has an MA780A present.

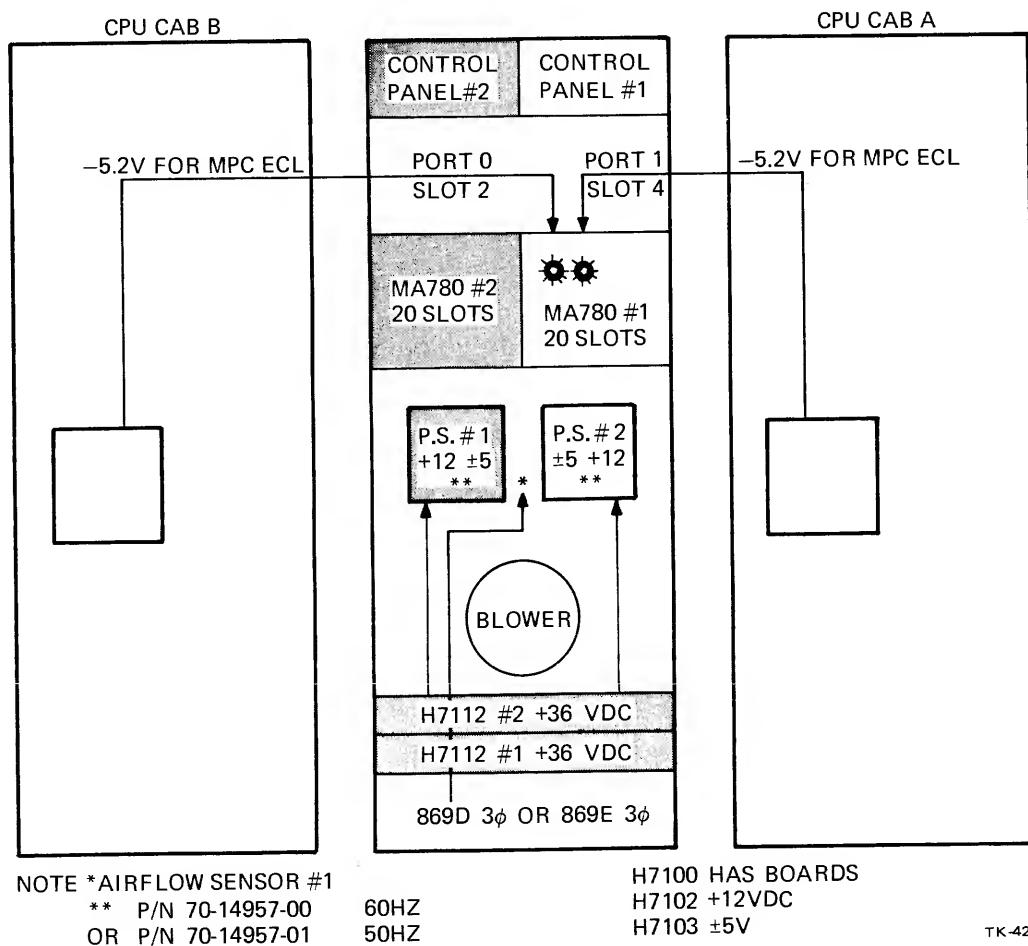


Figure 9-25 MA780A (#1) and MA780B (#2) Physical Location

#### 9.4.1 Installation

1. Halt and power down the connected VAX-11/780 systems. Set the main circuit breaker on the power controllers of both systems to OFF and remove all ac connections to the systems.
2. Remove the dummy panels from the MA780 cabinet.
3. Take the MA780B card cage from the shipping container and check backplane for damage (specifically bent pins).
4. From the back, install the MA780B card cage next to the present MA780A card cage in the MA780 cabinet.
  - a. From the back of the cabinet fasten the MA780B card cage top to the frame of the cabinet with the three screws and washers supplied with the MA780B card cage.
  - b. From the front of the cabinet secure the bottom of the MA780B card cage to the cabinet frame with the three screws and washers supplied.
5. Check the card cage for proper board placement (Figure 9-26).

#### 9.4.2 Jumper Installation

Install the jumpers on the MA780B as directed in paragraph 9.3.2.2.

20	M9045 PORT 0 BDI CONNECT
19	M8250 MPC MULTIPORT PORT CONTROL 0
18	M9045 PORT 1 BDI CONNECT
17	M8259 MPC MULTIPORT PORT CONTROL 1
16	M9045 PORT 2 BDI CONNECT (OPTIONAL)
15	M8259 MPC MULTIPORT PORT CONTROL 2 (OPTIONAL)
14	M9045 PORT 3 BDI CONNECT (OPTIONAL)
13	M8259 MPC MULTIPORT PORT CONTROL 3 (OPTIONAL)
12	M8260 MAT MULTIPORT ARRAY TIMING
11	M8212 MDT MEMORY DATA PATH
10	M8261 MPS MULTIPORT PORT SYNCHRONIZER
9	M8210 MAP SELECTIVE CACHE MAP (OPTIONAL)
8	M8210 MAY 0 - 256K BYTE
7	M8210 MAY 256 - 512 BYTE (OPTIONAL)
6	M8210 MAY 512 - 756K BYTE (OPTIONAL)
5	M8210 MAY 756 - 1000K BYTE (OPTIONAL)
4	M8210 MAY 1.0 - 1.25M BYTE (OPTIONAL)
3	M8210 MAY 1.25 - 1.5M BYTE (OPTIONAL)
2	M8210 MAY 1.5 - 1.75M BYTE (OPTIONAL)
1	M8210 MAY 1.75 - 2.0M BYTE (OPTIONAL)

TK-7212

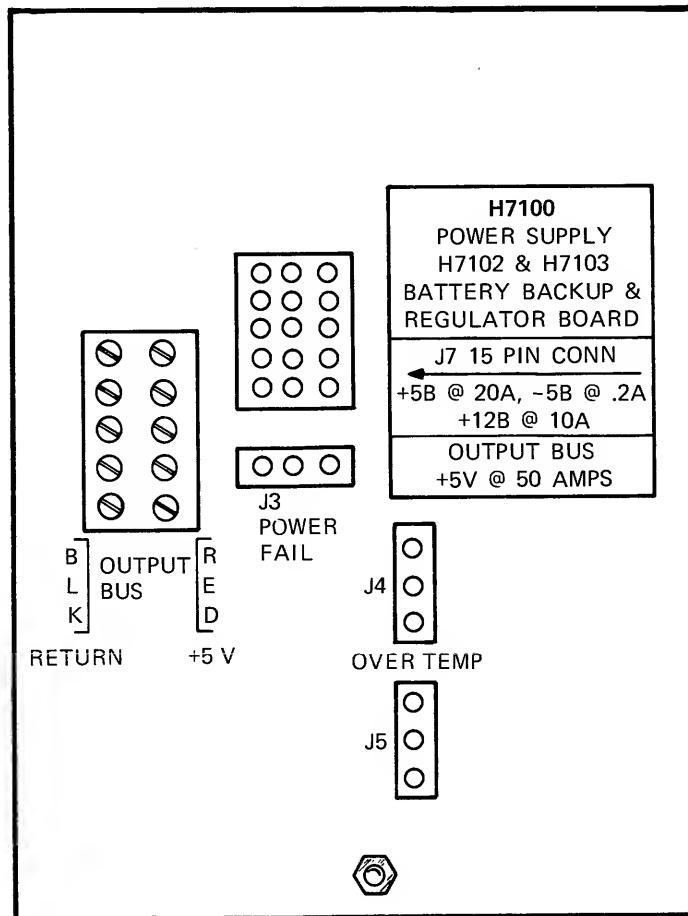
Figure 9-26 MA780A/B Module Utilization

### 9.4.3 Memory Power Supply Installation

Power supply 2 comes with the MA780A in the MA780 cabinet. Power supply 1 is the MA780B option power supply. These two power supplies are memory power supplies. The part number is:

P/N 70-14957-00 60 Hz  
P/N 70-14957-01 50 Hz

1. The procedure for installing the memory power supply follows:
  - a. At the front of the cabinet, remove the blank cover from power supply mounting chassis slot 1. Remove the screw from the front and release the power latch at the back of the cabinet.
  - b. Remove the new power supply from the shipping container and place it in the power supply slot. Be sure to align the pin at back of power supply with the hole at back of power supply mounting chassis.
  - c. Fasten the back of the power supply to the chassis by placing the slide assembly over the pin of the power supply (Figure 9-27).
  - d. Fasten the front of the power supply to the power supply mounting chassis with the screw removed in step a.



TK-5156

Figure 9-27 Memory Power Supply (Back View)

2. Connect the power cables to the memory power supply (Figure 9-28).
  - a. From the back of the MA780 cabinet install two black cables (P/N 7014250-01) from the power supply return strip to J5 of the MA780B backplane.
  - b. Install two red cables (P/N 7014529-1D) from the power supply +5 volt strip to J2 of the MA780B backplane.
  - c. Install cable (P/N 7014234-1E)) plug J1 to J7 of the MA780B memory power supply. Connect plug J2 to connector J10 of the MA780B backplane. Connect plug J3 to connector J1 of the MA780B backplane.

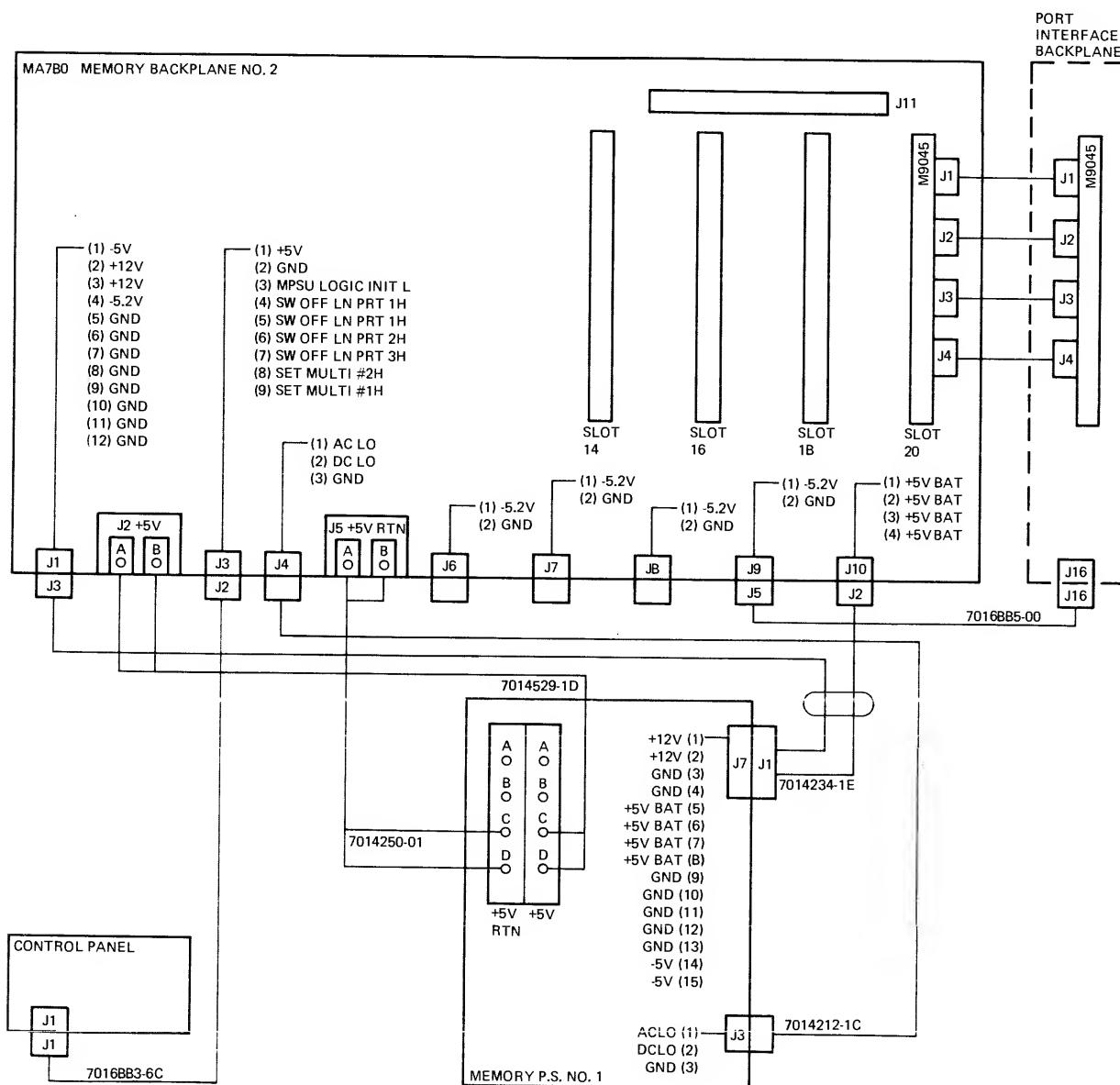


Figure 9-28 MA780B Memory Power Supply Wiring

- d. Install ac/dc lo cable (P/N 7014212-1C) from J3 of the MA780B memory power supply to J4 of the MA780B backplane.
- e. Connect plug J2 of the cable (P/N 7016883-6C) to connector J3 of the MA780B backplane. The other end of the cable connects to the MA780 control panel.

3. Install the overtemperature cable (Figure 9-30). Connect the cable (P/N 7014213-0K) from J4 of power supply 2 to J5 of power supply 1.

4. AC Power Installation

- a. Install the ac power cord to the front of power supply 1 and plug the other end into J14B of the 869D/E power controller (Figures 9-29 and 9-30).
- b. Check ac power to the power supply (refer to paragraph 3.5 of the *VAX-II/780 System Installation Guide*, EK-SI780-IN).

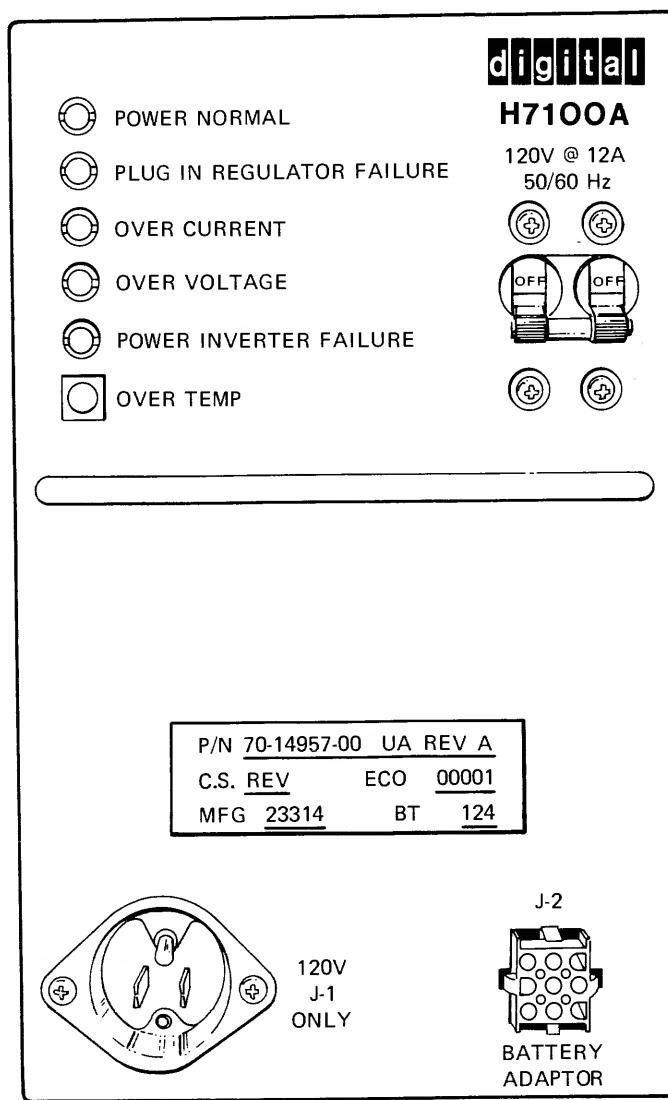


Figure 9-29 Memory Power Supply (Front View)

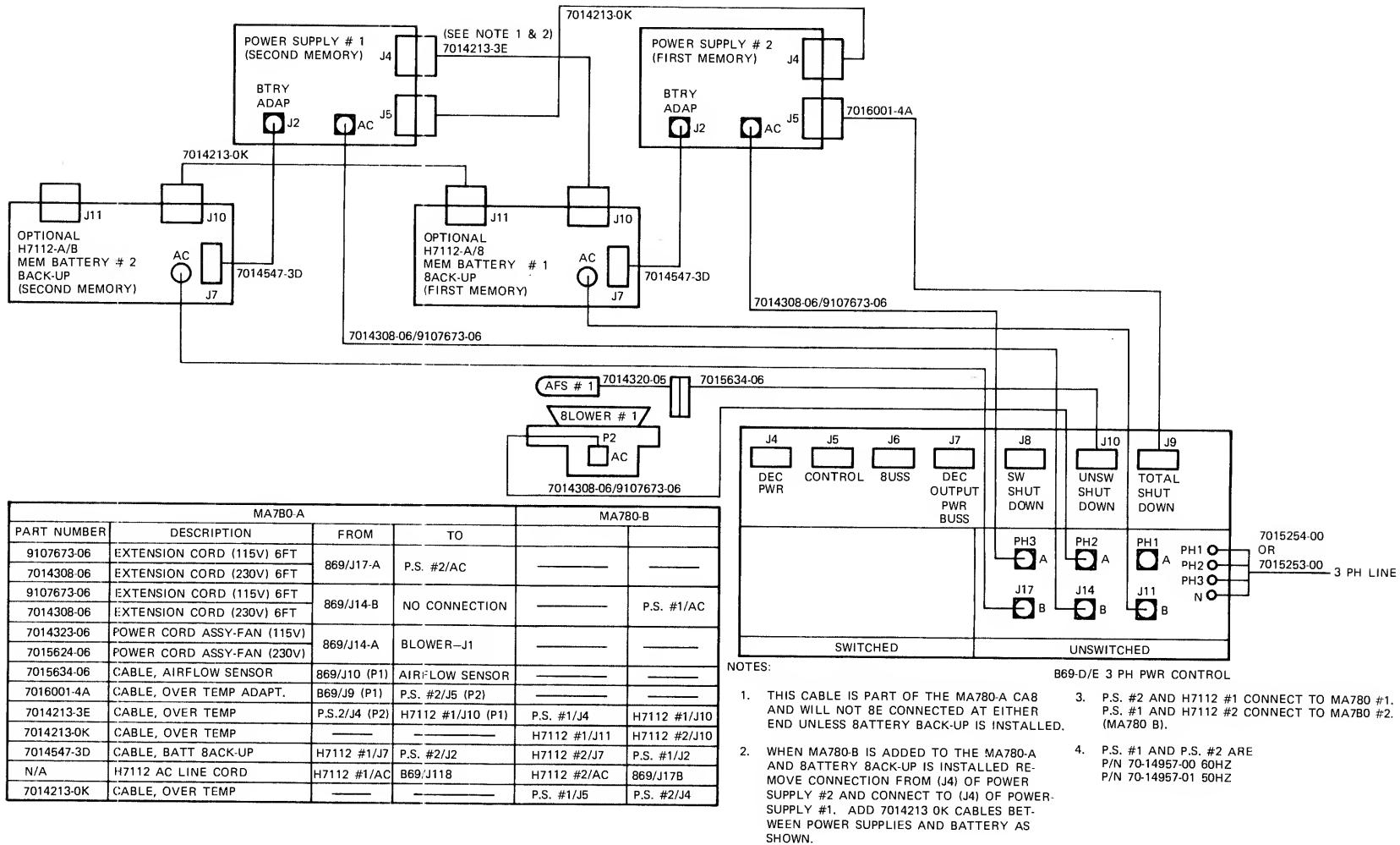


Figure 9-30 MA780B Option AC Power Connections

#### **9.4.4 Control Panel**

A new MA780 control panel extrusion and MA780 control panel are part of the MA780B option. The following paragraphs describe the removal of the old control panel extrusion and the installation of the new control panel extrusion along with the added MA780 control panel.

##### **9.4.4.1 Removal of Single Control Panel and Control Panel Extrusion –**

1. Remove the top panel from the MA780 cabinet.
2. Remove the control panel and control panel extrusion.
  - a. Remove the two screws and washers holding the top of the single control panel and panel extrusion to the MA780 cabinet.
  - b. Remove the two screws and washers holding the MA780 control panel and extrusion panel to the front of the MA780 cabinet.
  - c. Carefully lower the control panel extrusion until the connector and plug J1 are accessible.
  - d. Disconnect the plug J1 from the MA780 control panel connector J1.
3. Remove the MA780 control panel from the panel extrusion by removing the four screws holding the control panel to the panel extrusion.

##### **9.4.4.2 MA780 Dual Control Panel and Panel Extrusion Installation –**

1. Install the MA780 control panel removed from the extrusion panel in paragraph 9.4.4.1, step 3, into the opening provided in the new control panel extrusion.
2. Connect plug J1 from MA780A (#1) to the MA780 control panel on the right side of the extrusion panel.
3. Connect plug J1 from MA780B (#2) to the MA780 control panel on the left side of the extrusion panel.
4. Place the MA780 control panel extrusion to the top front of the MA780 cabinet and fasten the front of the panel to the cabinet.
5. Fasten the top of the MA780 control panel extrusion to the top of the MA780 cabinet.
6. Replace the top panel on the MA780 cabinet.

#### **9.4.5 H7112A/B Battery Backup Installation**

Refer to paragraph 9.8 for H7112A/B battery backup installation procedure.

#### **9.4.6 MA780C Installation**

The MA780C backplanes, M9045 paddle cards, BDI cables, and the SBI Terminator are installed as directed in paragraph 9.2.1.

#### **9.5 MA780D OPTION**

The MA780D validate map option is composed of one M8210 board plugged into slot 9 of the MA780A/B card cage.

## 9.6 MA780E OPTION

The MA780E option contains an MA780C and an H7100A/B power supply. This option can be installed in the CPU cabinet or in the SBI cabinet. The following several guidelines may help with the installation of the MA780E.

1. When more than two ports are to be on an SBI, the second MA780C should be adjacent to the first MA780C (short MARK INLK cable).
2. A maximum of two ports can take power from an option (MS780, RH780, DW780) power supply.
3. The MA780E power supply (H7100A/B) can be used to power the second MA780C or as a dedicated power supply for two MA780Cs.

### 9.6.1 MA780E Installation in CPU Cabinet

The MA780C can be installed in the CPU cabinet using the MA780E power supply (H7100A/B) or an option (MS780, RH780, DW780) power supply. The first MA780C in the CPU cabinet uses the option supply. The second MA780C in the CPU cabinet usually uses the MA780E power supply.

#### 9.6.1.1 Installing the First MA780C in CPU Cabinet –

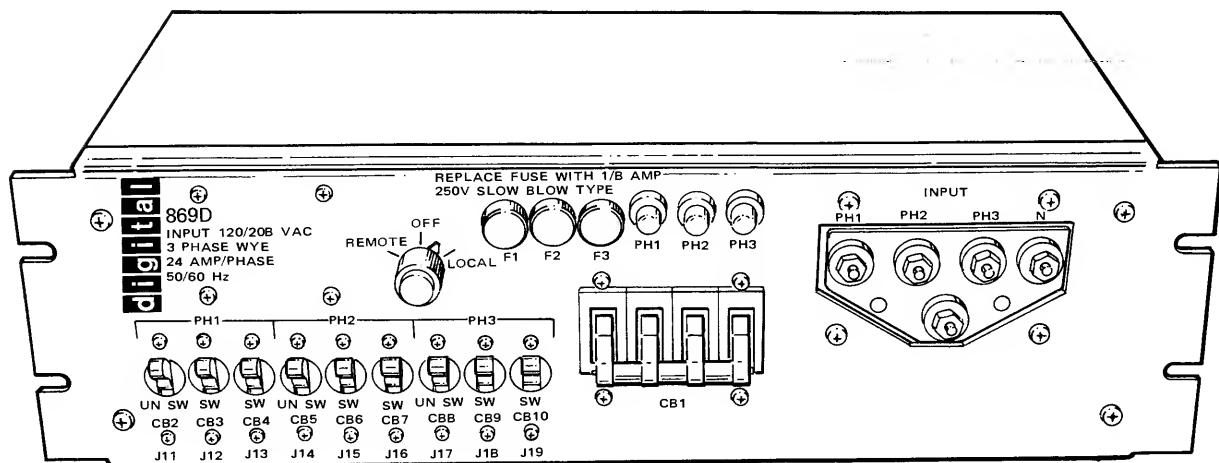
1. Halt and power down the connected VAX-11/780 systems. Set the main circuit breaker on the power controllers of all systems to OFF and remove all ac connections to the systems.
2. The procedure for installing the MA780C in the CPU cabinet is given in paragraph 9.2. The MA780E H7100A/B power supply is not used.

#### 9.6.1.2 Installing the Second MA780C in CPU Cabinet – A standard VAX-11/780 CPU arrangement does not have room for the installation of a second MA780C in the CPU cabinet. The following procedure applies the case of a nonstandard system.

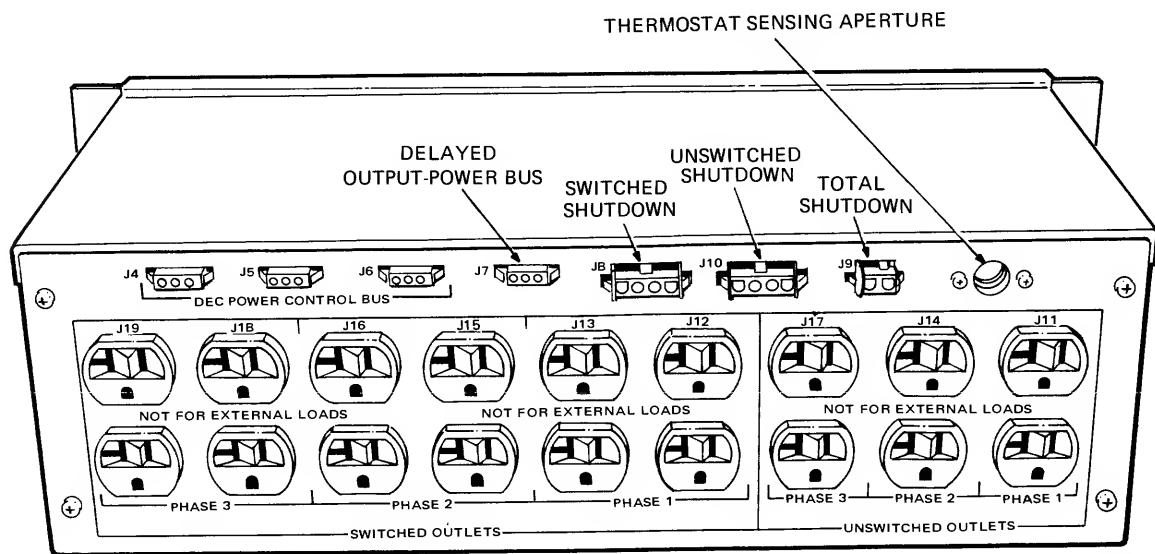
1. Halt and power down the connected VAX-11/780 systems. Set the main circuit breaker on the power controllers of all systems to OFF and remove all ac connections to the systems.
2. Install the MA780C as directed in paragraph 9.2.1.
3. The procedure for installing the H7100A/B power supply is as follows.
  - a. At the front of the cabinet, remove the blank cover from the power supply mounting chassis slot to be used. Remove the screw from the front and release the power latch at the back of the cabinet.
  - b. Remove the new power supply from the shipping container and place it in the power supply slot. Be sure to align the pin at back of power supply with the hold at back of power supply mounting chassis.
  - c. Fasten the back of the power supply to the chassis by placing the slide assembly over the pin of the power supply.
  - d. Fasten the front of the power supply to the power supply mounting chassis with the screw removed in step a.

4. Use the following procedure for connecting the overtemperature and ac power cables.

- Connect the overtemperature cable (P/N 7014213-OK) from J4 of the option power supply to J5 at the back of the MA780E power supply (H7100A/B).
- Locate and install the power supply ac cable to the 869D/E power controller on the switched side, the lower left side of the cabinet. Connect the female end of the ac power cord to the front of the power supply in the receptacle provided (Figures 9-31 and 9-32).
- Check ac power to the power supply (refer to paragraph 3.5 of the *VAX-11/780 System Installation Guide*, EK-SI780-IN).

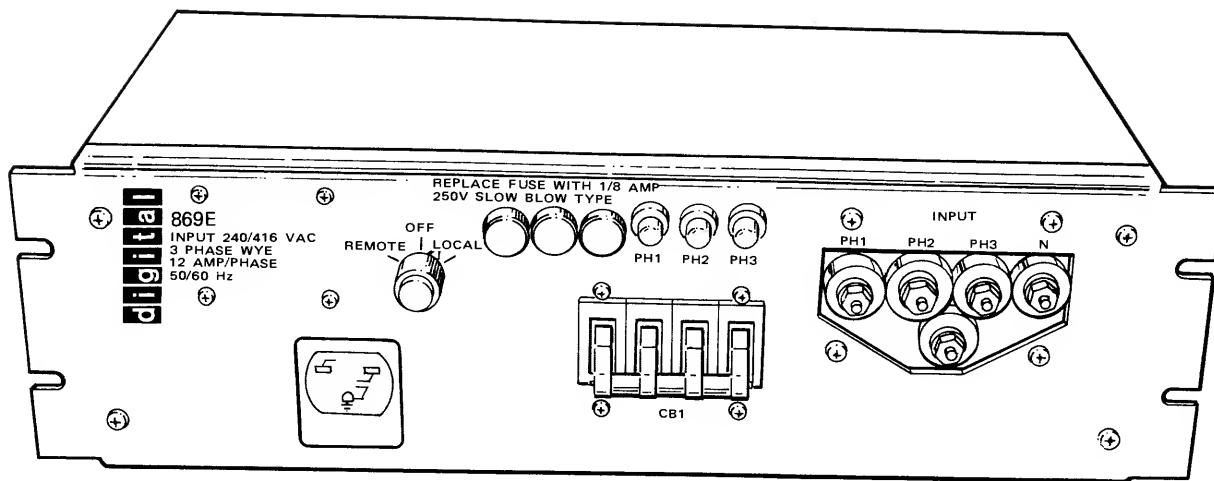


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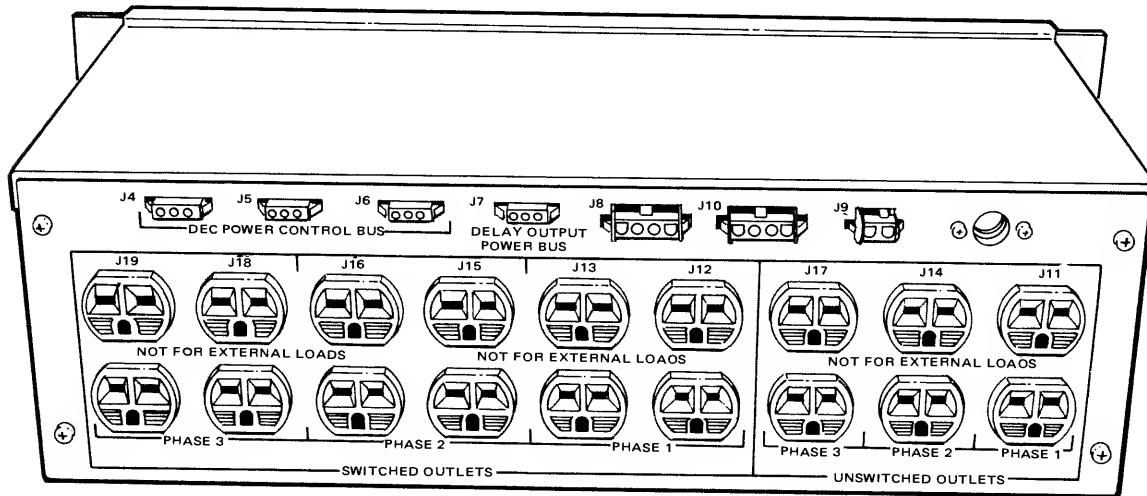


TK-0453

Figure 9-31 869D Power Controller (Front and Back Views)



TK-0423



TK-0456

Figure 9-32 869E Power Controller (Front and Back Views)

5. Install the power harness cables as follows:
  - a. For a three-port installation, connect the three power harness cables (P/N 7016885-00) (Figure 9-33). Cable (P/N 7016884-00) is inserted in J14 of the second MA780C if the SBI is terminated with the M9040 in the MA780C. If the SBI continues on to the expander cabinet, J14 has no connections and cable (P/N 7016884-00) is not used (Figure 9-35 contains the notes and tables for Figure 9-33).
  - b. For a four-port installation, connect the four power harness cables (Figure 9-34). The SBI continues on to the SBI expander cabinet and is terminated there (Figure 9-35 contains the notes and tables for Figure 9-34).

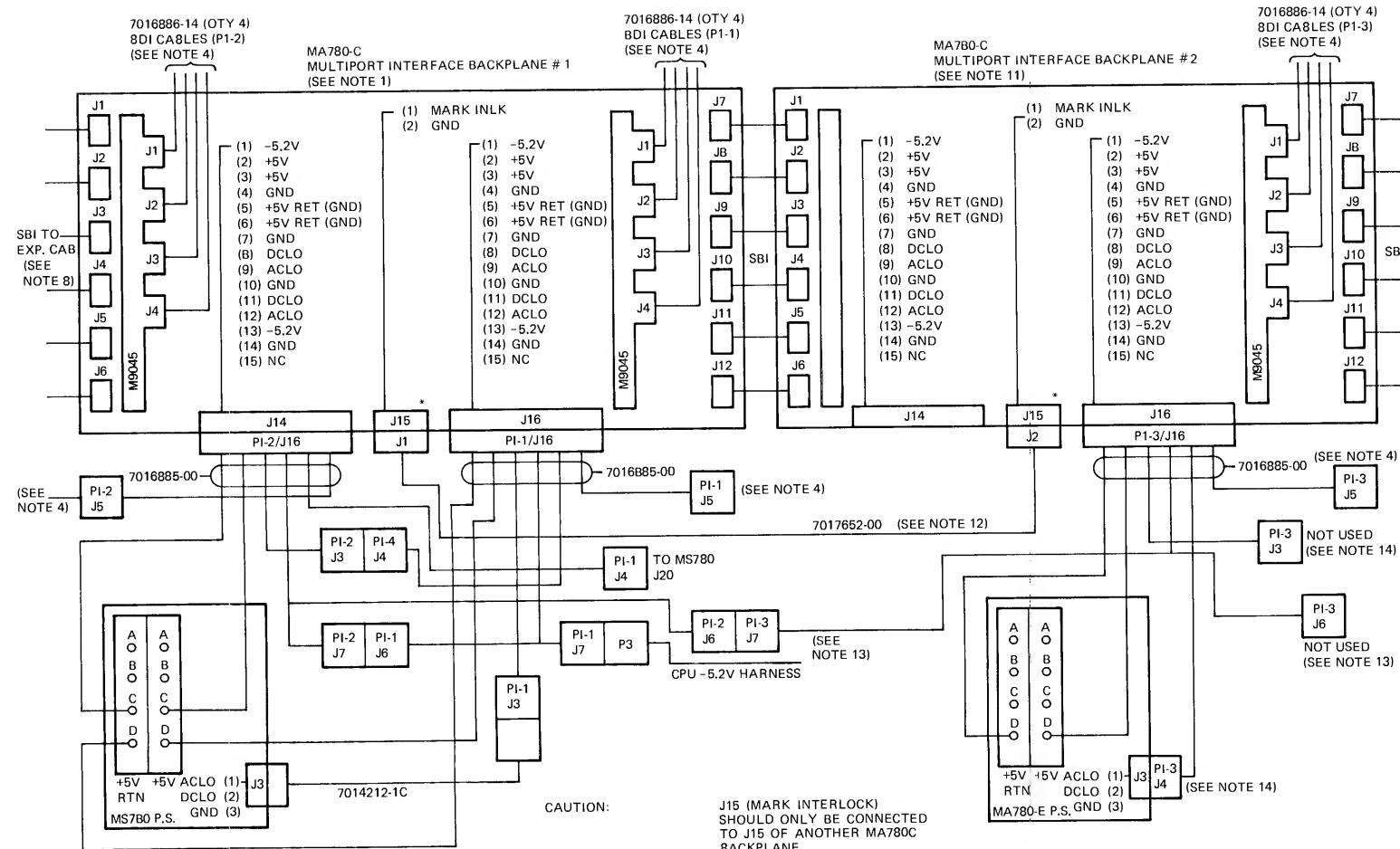


Figure 9-33 MA780C Power Cables with Three Ports on SBI

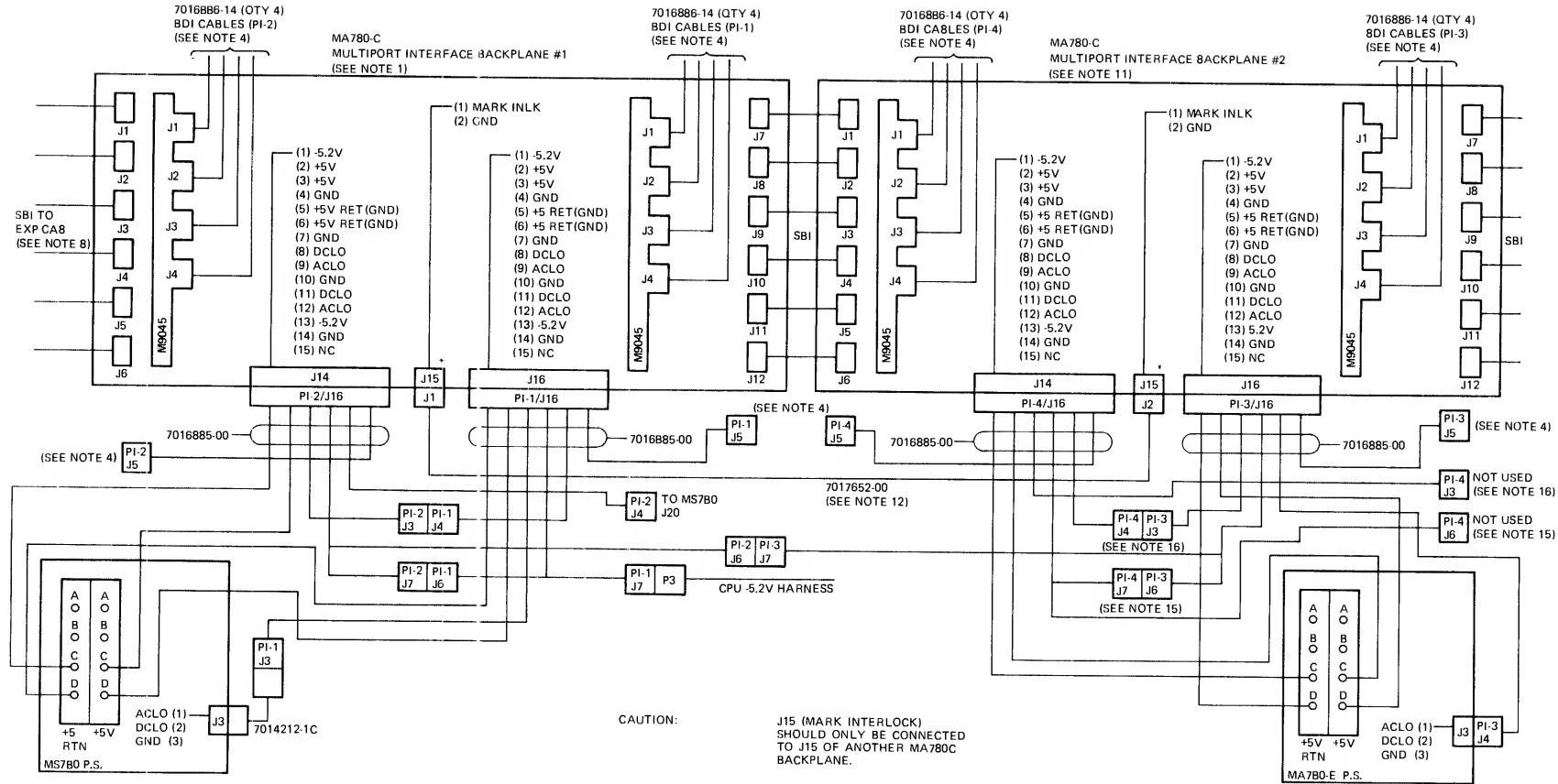


Figure 9-34 MA780C Power Cables with Four Ports on SBI

TABLE 3 (3 PORTS ON SBI)		FIRST PORT (MA780-C BP # 1)		SECOND PORT (MA780-C BP #1)		THIRD PORT (MA780-C BP #2)		REMARKS
PART NUMBER	DESCRIPTION	FROM/WITH	TO	FROM/WITH	TO	FROM/WITH	TO	
7016885-00 (3 REQ)	MPI POWER HARNESS	PI-1 (J16)/RED WIRES	MS780 P.S./+5V-D	PI-2 (J16) RED WIRES	MS780 P.S./+5V-C	PI-3 (J16)/RED WIRES	MA780-E P.S./+5V-D	+5V
		PI-1 (J16)/BLK WIRES	MS780 P.S./+5V RTN-D	PI-2 (J16) BLK WIRES	MS780 P.S./+5V RTN-C	PI-3 (J16)/BLK WIRES	MA780-E P.S./+5V RTN-D	+5V RTN(GND)
		PI-1 (J16)/J3	MS780 P.S./J3(7014212-1C)	PI-2 (J16)/J3	PI-1/J4	PI-3 (J16)/J3	NO CONNECTION	AC, DCLO
				PI-2 (J16)/J4	MS780 BP/J20	PI-3 (J16)/J4	MA780-E P.S./J3	AC, DCLO
		PI-1 (J16)/J5	MA780 BP/APPROPRIATE -5.2V CONN. FOR PORT	PI-2 (J16)/J5	MA780 BP/APPROPRIATE -5.2V CONN. FOR PORT	PI-3 (J16)/J5	MA780 BP/APPROPRIATE -5.2V CONN. FOR PORT	-5.2V
		PI-1 (J16)/J6	PI-2/J7	PI-2 (J16)/J6	PI-3/J7	PI-3 (J16)/J6	NO CONNECTION	-5.2V
		PI-1 (J16)/J7	CPU -5.2V HARNESS/P3					-5.2V
7017652-00	MARK INLK			MA780-C #1(J15)/J1	MA780-C #2(J15)/J2			MARK INLK

TABLE 4 (4 PORTS ON SBI)		FIRST PORT (MA780-C BP #1)		SECOND PORT (MA780-C BP #1)		THIRD PORT (MA780-C BP #2)		FOURTH PORT (MA780-C BP #2)		REMARKS
PART NUMBER	DESCRIPTION	FROM/WITH	TO	FROM/WITH	TO	FROM/WITH	TO	FROM/WITH	TO	
7016885-00 (4 REQ)	MPI POWER HARNESS	PI-1 (J16)/RED WIRES	MS780 P.S./+5V-D	PI-2 (J16)/RED WIRES	MS780 P.S./+5V-C	PI-3 (J16)/RED WIRES	MA780-E P.S./+5V-D	PI-4 (J16)/RED WIRES	MA780-E P.S./+5V-C	+5V
		PI-1 (J16)/BLK WIRES	MS780 P.S./+5V RTN-D	PI-2 (J16)/BLK WIRES	MS780 P.S./+5V RTN-C	PI-3 (J16)/BLK WIRES	MA780-E P.S./+5V RTN-D	PI-4 (J16)/BLK WIRES	MA780-E P.S./+5V RTN-C	+5V RTN(GND)
		PI-1 (J16)/J3	MS780 P.S./J3(7014212-1C)	PI-2 (J16)/J3	PI-1/J4	PI-3 (J16)/J3	PI-4 (J16)/J4	PI-4 (J16)/J3	NO CONNECTION	AC,DCLO
				PI-2 (J16)/J4	MS780 BP/J20	PI-3 (J16)/J4	MA780-E P.S./J3			AC,DCLO
		PI-1 (J16)/J5	MA780 BP/APPROPRIATE -5.2V CONN. FOR PORT	PI-2 (J16)/J5	MA780 BP/APPROPRIATE -5.2V CONN. FOR PORT	PI-3 (J16)/J5	MA780 BP/APPROPRIATE -5.2V CONN. FOR PORT	PI-4 (J16)/J5	MA780 BP/APPROPRIATE -5.2V CONN. FOR PORT	-5.2V
		PI-1 (J16)/J6	PI-2/J7	PI-2 (J16)/J6	PI-3/J7	PI-3 (J16)/J6	PI-4/J7	PI-4 (J16)/J6	NO CONNECTION	-5.2V
		PI-1 (J16)/J7	CPU-5.2V HARNESS/P3							-5.2V
7017652-00	MARK INLK			MA780-C #1(J15)/J1	MA780-C #2(J15)/J2					MARK INLK

## NOTES:

1. THE MA780-C OPTION INTERCONNECT DRAWINGS REPRESENT THE TYPICAL POWER CONNECTIONS OF FROM ONE TO FOUR PORTS ON A SINGLE SBI. TYPICALLY THE FIRST MA780-C BACKPLANE WILL REPLACE THE SFT (SBI TERMINATOR) IN THE CPU CABINET. IF TWO OR MORE PORTS ARE INSTALLED ON THE SAME SBI, A CPU EXPANDER CABINET IS REQUIRED AND THE SFT WILL TERMINATE THE SBI IN THE EXPANDER CABINET. IF TWO MA780-C BACKPLANE ARE REQUIRED (3 OR 4 PORTS ON ONE SBI) THE SECOND BACKPLANE WILL TYPICALLY MOUNT IN THE LAST 4 INCH OPTION SLOT IN THE CPU CABINET (NEXT TO THE FIRST MA780-C BACKPLANE).
2. IF FUTURE CONFIGURATIONS OR SPECIAL CUSTOMER REQUIREMENTS PREVENT A TYPICAL INSTALLATION, THE FOLLOWING PRECAUTIONS MUST BE OBSERVED
  - A. IF MOUNTED IN AN EXPANDER CABINET, THE MA780-C BACKPLANE MUST OCCUPY A 4 INCH OPTION SLOT (CANNOT REPLACE THE SFT). IF TWO MA780-C BACKPLANES ARE REQUIRED, THEY MUST OCCUPY ADJACENT OPTION SLOTS.
  - B. NO MORE THAN TWO PORTS MAY DERIVE THEIR POWER FROM AN MS780 OR RH780 POWER SUPPLY (ALL FOUR PORTS MAY DERIVE THEIR POWER FROM A SINGLE DEDICATED SUPPLY).
  - C. EACH PORT MUST BE CONNECTED TO THE ACLO DCLO SIGNALS FROM THE POWER SUPPLY FROM WHICH IT DERIVES ITS POWER.
  - D. EACH PORT MUST BE CONNECTED TO THE CPU -5.2V HARNESS.
  - E. CONFIGURATION GUIDELINES FOR OTHER OPTIONS MUST ALSO BE OBSERVED.
3. ALSO REFER TO FROM/TO TABLES ON THIS SHEET.
4. BDI CABLES (7016886-14) AND -5.2V CABLE (J5 OF 7016885-00) CONNECT TO THE MULTIPORT MEMORY BACKPLANE. REFER TO THE MULTI-SYSTEMS CONFIGURATION ILLUSTRATIONS WHICH DETAIL CABLE ROUTING AND CONNECTIONS
5. IN THE CPU CABINET THERE IS A -5.2V HARNESS (SEE FIGURE 9-20) WITH A NUMBER OF PIGTAILS EXTENDING FROM IT. PI-1/J7 WILL CONNECT TO THE LAST CONNECTOR IN THE HARNESS (P3). IF P3 IS NOT FREE THEN DISCONNECT IT FROM THE PREVIOUS OPTION BACKPLANE.
6. THERE IS AN AC, DCLO CABLE (7014212-1C) THAT RUNS BETWEEN J20 OF THE MS780 BACKPLANE AND J3 OF THE MS780 POWER SUPPLY. DISCONNECT THE CABLE AT J20 ON THE BACKPLANE. CONNECT PI-1/J4 OF 7016885-00 INTO J20 AND PI 1/J3 OF 7016885-00 INTO THE LOOSE END OF THE AC, DCLO CABLE CONNECTED TO THE MS780 POWER SUPPLY.
7. IF THIS MA780-C IS THE LAST DEVICE ON THE SBI, THERE WILL BE THREE CONNECTORS FREED UP AFTER THE SFT IS REMOVED TO ACCOMMODATE THIS DEVICE. THESE CONNECTORS WILL CONNECT TO J1, J2 AND J3 OF 7016884-00. IF THIS MA780-C IS NOT THE LAST DEVICE ON THE SBI, CABLE 7016884-00 IS NOT CONNECTED AND THE M9040 MODULE MUST NOT BE PRESENT IN SLOT 2 OF THIS BACKPLANE.
8. IN THIS CONFIGURATION THE SFT IS USED TO TERMINATE THE SBI AND IS LOCATED IN THE CPU EXPANDER CABINET. THE M9040 (TRM) MODULES MUST NOT BE PRESENT IN EITHER MA780-C.
9. THE CPU -5.2V IS PROPAGATED AS IN NOTES EXCEPT THAT PI-1/J6 IS CONNECTED TO PI-2/J7 AND PI-2/J6 TO THE PREVIOUS OPTION BACKPLANE (OR NOT USED IF THE LAST CPU OPTION SLOT IS NOT USED).
10. THE AC, DCLO SIGNALS ARE PROPAGATED AS IN NOTE 6 EXCEPT THAT PI-1/J4 IS CONNECTED TO PI-2/J3 AND PI-2/J4 IS CONNECTED TO J20 OF THE MS780 BACKPLANE.
11. THE SECOND MA780-C BACKPLANE IS MOUNTED IN THE LAST CPU OPTION SLOT. IF AN OPTION IS ALREADY IN THAT SLOT IT MUST BE MOVED TO THE SBI EXPANDER CABINET. THE M9040 (TRM) MODULE MUST BE REMOVED FROM THE MA780-C BACKPLANE.
12. THE MARK INLK CABLE MUST BE CONNECTED BETWEEN J15 OF THE FIRST MA780-C BACKPLANE AND J15 OF THE SECOND MA780-C BACKPLANE.
13. THE CPU -5.2V IS PROPAGATED AS IN NOTES 5 AND 9 EXCEPT THAT PI-2/J6 IS CONNECTED TO PI-3/J7 AND PI-3/J6 IS NOT USED.
14. THE AC, DCLO SIGNALS FOR THIS PORT ARE DERIVED FROM THE MA780-E POWER SUPPLY (PI-3/J4 TO P.S. J3). PI-3/J3 IS NOT USED.
15. THE CPU -5.2V IS PROPAGATED BY CONNECTING PI-3/J6 TO PI-4/J7. PI-4/J6 IS NOT USED.
16. THE AC, DCLO SIGNALS ARE PROPAGATED BY CONNECTING PI-3/J3 TO PI-4/J4. PI-4/J3 IS NOT USED.

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Figure 9-35 Three and Four Ports on SBI

### **9.6.2 MA780E Option Installation in SBI Expander Cabinet**

The MA780C can be installed in the SBI expander cabinet using the MA780E H7100A/B power supply or an option (MS780, RH780, DW780) power supply. The first MA780C in the SBI expander cabinet can use the option supply; the second must use the MA780E H7100A/B power supply.

#### **9.6.2.1 Installing the First MA780C in SBI Expander Cabinet –**

1. Halt and power down the connected VAX-11/780 systems. Set the main circuit breaker on the power controllers of all systems to OFF and remove all ac connections to the systems.
2. Install the MA780C as directed in paragraph 9.2.1.
3. The SBI terminator in the SBI expander cabinet must be the M9043 SFT.
4. Connect the MA780E H7100A/B power supply.
  - a. If an option (MS780, RH780, DW780) power supply is present, it can be used. If not, install the H7100A/B power supply in the SBI expander cabinet. If the H7100A/B is power supply 1, the cable goes to J14B (unswitched) of the power controller, otherwise the cable goes to J17A.
  - b. The MA780C power cable for a single port is installed as directed in paragraph 9.2.2.1 (Figure 9-20). The cable to J14 (P/N 7016884-00) is not used; the SFT cable serves this purpose. Cable (P/N 7016884-00) is excess material.
  - c. The MA780C power cable for two ports in an MA780C is installed as directed in paragraph 9.2.2.2 (Figure 9-21). Again, cable (P/N 7016884-00) is excess material.

#### **9.6.2.2 Installing the Second MA780C in SBI Expander Cabinet –**

1. Halt and power down the connected VAX-11/780 systems. Set the main circuit breaker on the power controllers of all systems to OFF and remove all ac connections to the systems.
2. Install the MA780C as directed in paragraph 9.2.1.
3. Use the following procedure to install the H7100 power supply.
  - a. At the front of the cabinet, remove the blank cover from power supply mounting chassis slot to be used. Remove the screw from the front and release the power latch at the back of cabinet.
  - b. Remove the new power supply from the shipping container and place it in the same power supply slot. Be sure to align the pin at the back of power supply with the hole at back of power supply mounting chassis.
  - c. Fasten the back of the power supply to the chassis by placing the slide assembly over the pin of the power supply.
  - d. Fasten the front of the power supply to the power supply mounting chassis with the screw previously removed in step a.

4. Use the following procedure to connect the overtemperature and ac power cables.
  - a. Connect the overtemperature cable (P/N 7014213-OK) from J4 of the option power supply present in the SBI expander cabinet to J5 at the back of the MA780E power supply (H7100).
  - b. Locate and install the power supply ac cable to the 869D/E power controller on the switched side, the lower left side of the cabinet. Connect the female end of the ac power cord to the front of the power supply in the receptacle provided (Figures 9-29, 9-31, and 9-32).
  - c. Check ac power to the power supply (paragraph 3.5 of the *VAX-11/780 System Installation Guide* EK-SI780-IN).
5. Install the power harness cables (P/N 7016885-00) as follows:
  - a. For a three-port installation connect the three power harness cables (Figures 9-33 and 9-35).
  - b. For a four-port installation connect the four power harness cables (Figures 9-34 and 9-35).

## 9.7 H9604 LEFT EXPANSION CABINET KIT INSTALLATION

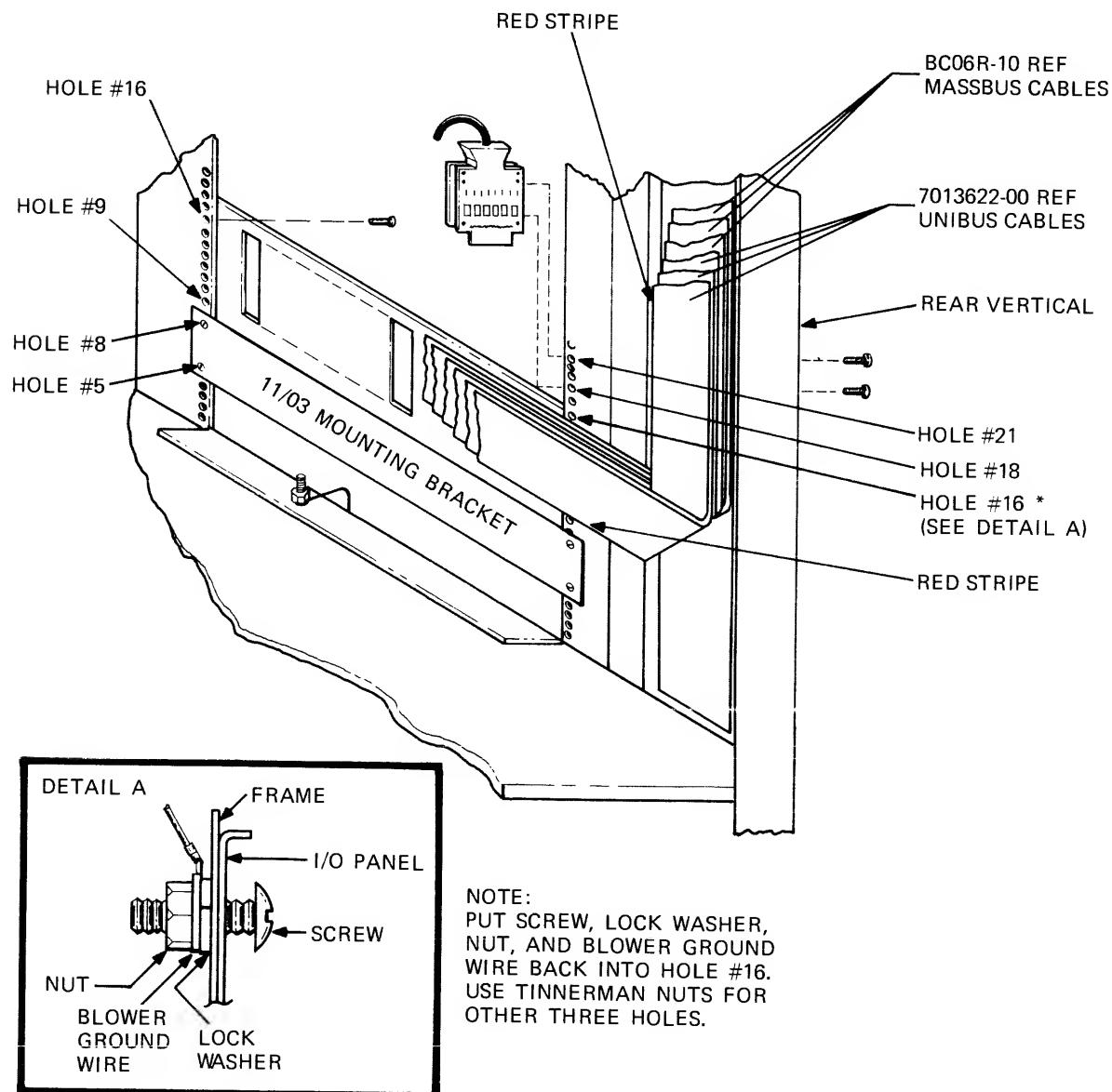
The M9604 left expansion kit is used with the MA780 option in a two- to four-system configuration. Engineering Drawing AD-H9604 can be used as a reference during installation of this kit. The H9604 consists of:

- Cabinet-to-cabinet connector panel
- Power control bus adapter cable
- Various screws and nuts

Use the following procedure to install the H9604:

1. Remove the following parts from the CPU cabinet:
  - a. front and back doors
  - b. top panel
  - c. left side panel to be installed on left most cabinet
  - d. exhaust plenum
2. Remove the CPU control panel and place it on the top of the cabinet.
3. Remove top and side filler strips from the right side of the CPU/SBI expander cabinet unit.
4. Remove the end panel from the right most unit (UNIBUS expander or tape unit cabinet). This end panel will not be used again.
5. Separate the UNIBUS expander cabinet from the CPU/SBI expander cabinet unit. Separate the tape unit cabinet (if present) from the UNIBUS expander cabinet.

6. Add the cabinet to cabinet I/O panel on the left side of the CPU cabinet using the following procedure (Figure 9-36).
  - a. Remove the H7003 filter assembly from the left side of the CPU cabinet. Systems with the LA36 terminal have an H7003 filter for the 20 mA current loop.
  - b. Remove the blower ground cable from hole 16.
  - c. Install the I/O panel and the blower ground cable.
  - d. Install the H7003 filter assembly.



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Figure 9-36 Left I/O Panel Installation

7. Reroute the UNIBUS cables from the right side of the cabinet to the new I/O panel on the left side. Connect as follows:

M9042-J2	to	I/O connector J3
M9042-J3	to	I/O connector J1
M9042-J1	to	I/O connector J2

8. Reroute the MASSBUS cables from the right side of the old I/O panel to the new left side I/O panel. Connect as follows:

M9041-C	to	I/O connector J4
M9041-B	to	I/O connector J5
M9041-A	to	I/O connector J6

9. Install the power control bus as follows:

- a. Remove the power control cable (P/N 7015442-03) from J7 (delayed output power bus) of the 869D/E power controller.
- b. Plug P1 of cable (P/N 7016506-3L) into J7 of the 869D/E power controller.
- c. Connect J2 of cable (P/N 7016506-3L) to P1 of cable (P/N 7015442-03).

10. Connect J1 of cable (P/N 7016506-3L) to J8 of the expander I/O connector panel.

11. Move the UNIBUS expander cabinet to the left side of the CPU cabinet and fasten the two together.

12. Move the tape unit cabinets (if present) to the left side of the UNIBUS expander cabinet and fasten to UNIBUS expander cabinet.

13. Fasten the top and side filler strips to the left side of the CPU cabinet.

14. Take the side panel removed in the first step and install it on the left most cabinet.

15. Connect all ground straps.

16. Connect all UNIBUS and tape unit cabinet-to-cabinet cables.

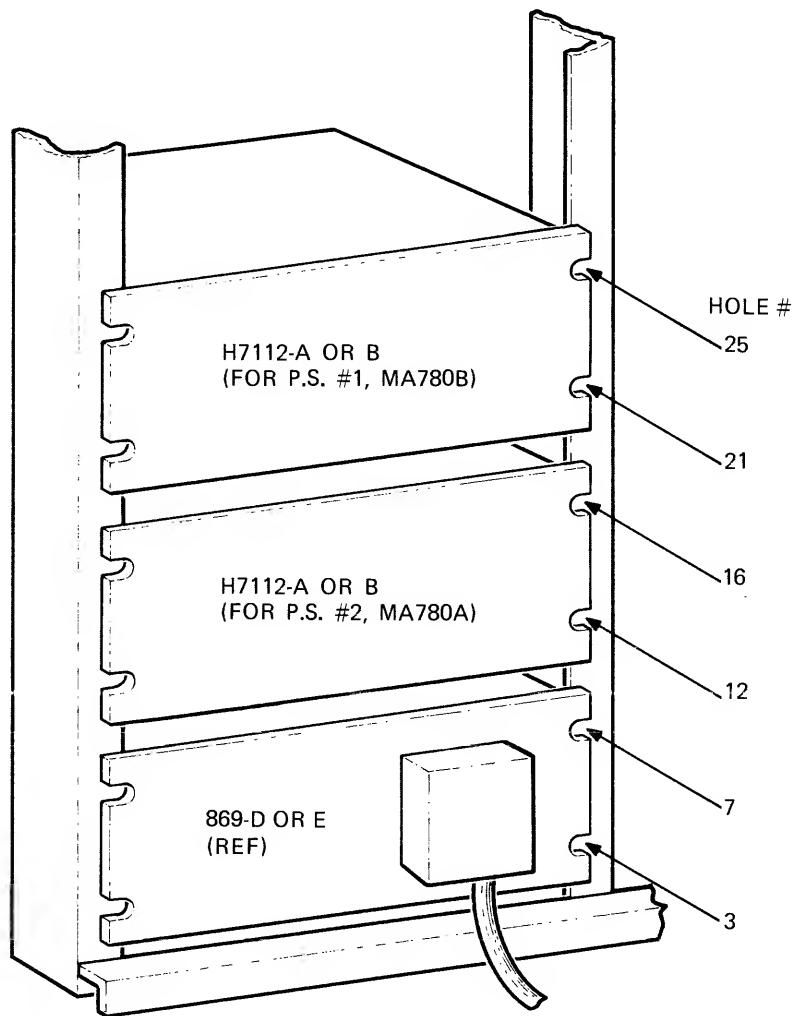
17. Reassemble the CPU cabinet parts in the following order:

- a. control panel
- b. exhaust plenum
- c. top panel
- d. front and back doors

## 9.8 H7112A/B BATTERY BACKUP INSTALLATION

The MOS memory in the MA780A/B is volatile and requires that power be maintained at all times. The H7112A/B battery backup unit serves this purpose when ac power is not present. The MA780 cabinet can hold up to two H7112A/B battery backup units. Install the H7112A/B battery backup units as follows:

1. Halt and power down the connected VAX-11/780 systems. Set the main circuit breaker on the power controllers of all systems to OFF and remove all ac connections to the systems.
2. Remove the H7112A/B backup unit from the shipping container.
3. Install Tinnerman nuts at the proper hole locations (Figure 9-37).



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Figure 9-37 H7112 Battery Backup Location

4. From the front of the MA780 cabinet, slide the H7112A/B battery backup unit into the MA780 cabinet (Figure 9-37).
5. Secure the H7112A/B battery backup unit to the MA780 cabinet frame with four screws (Figure 9-37).
6. Connect the cables to the H7112A/B battery backup units (Figure 9-30).

## 9.9 SBI TERMINATOR ASSEMBLY

The following paragraphs describe the removal and installation of the SBI terminator assembly for the VAX-11/780 system.

1. The SBI is terminated by either the M9043 SFT or by the M9040, not both.
2. The SBI terminator in the SBI expander cabinet is always the M9043 SFT.
3. The M9040 SBI terminator uses slot 2 of the MA780C backplane, which is the same slot used by the second port in the MA780C. If both ports in the MA780C are to be used, then the SBI cannot be terminated in that MA780C.
4. The M9043 SFT location in the CPU cabinet is on a 3 1/4-inch blank. The M9043 SFT locations in the SBI expander cabinet are 4-inch blanks.

### 9.9.1 Replacing M9043 SFT With M9040 in MA780C

Use the following procedure to replace the M9043 SFT with the M9040 in the MA780C backplane.

1. Halt and power down the connected VAX-11/780 systems. Set the main circuit breaker on the power controllers of all systems to OFF and remove all ac connections to the systems.
2. From the back of the cabinet:
  - a. Remove and save the six long SBI jumper cables (P/N 1700087-01) connected from the SBI terminator to the adjacent backplane.
  - b. Disconnect plugs P7, P8 and P9 from the lower portion of the SBI terminator.
  - c. Remove and save the two screws that hold the 3 1/4-inch blank (with SBI terminator) to the top of the card cage.
3. From the front of the cabinet remove and save the four screws that hold the 3 1/4-inch blank (with SBI terminator) to the bottom of the card cage.
4. Remove the 3 1/4-inch blank (with SBI terminator) from the card cage by sliding the assembly out from the back of the cabinet.
5. Carefully pack the M9043 SFT terminator and 3 1/4-inch blank with the screws saved in step 3. These parts will be needed if an SBI expander cabinet is ordered for this CPU at a later date.
6. After the MA780C backplane has been installed in the CPU cabinet, install the six long SBI jumper cables saved in step 2.a.

### 9.9.2 Moving M9043 SFT from CPU to SBI Expander Cabinet

Use the following procedure to move the M9043 SFT from the CPU cabinet to the SBI expander cabinet.

1. Halt and power down the connected VAX-11/780 systems. Set the main circuit breaker on the power controllers of all systems to OFF and remove all ac connections to the systems.
2. From the back of the cabinet:
  - a. Remove and save the six SBI long jumper cables (P/N 1700087-01) connected from the SBI terminator to the adjacent backplane.
  - b. Disconnect plugs P7, P8 and P9 from the lower portion of the SBI terminator.
  - c. Remove and save the ten screws which hold the M9043 SFT to the 3 1/4-inch blank.
  - d. Install the M9043 SFT on the 4-inch logic blank (either 1, 4 or 6) in the SBI expander cabinet. Use the ten screws removed in step c.
3. Remove the 3 1/4-inch blank from the CPU cabinet.
  - a. From the back remove and save the two screws that hold the 3 1/4-inch blank to the top of the card cage.
  - b. From the front remove and save the four screws that hold the 3 1/4-inch blank to the bottom of the card cage.
  - c. Remove the 3 1/4-inch blank from the card cage by sliding the assembly out from the back of the cabinet.
  - d. The screws removed in steps a and b can be used to fasten the MA780C backplane in this 3 1/4-inch space. The 3 1/4-inch blank is excess material.
4. After the other options have been installed in the CPU cabinet and SBI expander cabinet, do the following from the back of the SBI expander cabinet.
  - a. Install the six long SBI jumper cables (P/N 1700087-01) from the last SBI option to the M9043 SFT.
  - b. Connect P7 to J7 and P2 to J8. In the SBI expander cabinet J9 is not used.

## 9.10 MA780 DIAGNOSTICS

There are three types of diagnostics for the MA780: microdiagnostics, macrodiagnostics, and UETP. Microdiagnostics should be run first. After running microdiagnostics with no failures, run macrodiagnostics. Finally, after passing both microdiagnostics and macrodiagnostics with no failures, run UETP.

### **9.10.1 MA780 Microdiagnostics**

The microdiagnostics for the MA780 are on RX #22 of the VAX-11/780 microdiagnostic diskette set. RX #22 contains ESKAN which has sections 3E to 65 of the VAX-11/780 microdiagnostics; these sections test the MA780. For detailed procedures on running these microdiagnostics refer to section 4.6 of the ESKAA file (on microfiche). Sections 3E to 62 are divided into three groups and are run using the procedures for the previous VAX-11/780 microdiagnostics.

Section 63, the powerfail test, requires manual intervention by the person running the microdiagnostics.

Sections 64 and 65, the CPU to CPU interaction test, requires an RX #22 at each CPU.

### **9.10.2 Macrodiagnostics (ESCCB)**

The program ESCCB is a level 3 standalone diagnostic exerciser run under control of the diagnostic supervisor (ESSAA). ESCCB is on diskette RX #57 and ESSAA is on RX #8. The program is designed to exercise two to four VAX-11/780 CPUs connected to one or two MA780 multiport memories. The detailed information needed to run this exerciser is in the ESCCB listings (on microfiche).

**9.10.2.1 Hardware Requirements** – The program ESCCB needs the following:

- Two to four VAX-11/780 CPUs with 256 kilobytes memory in each
- One or two MA780 multiport memories
- An MS780 memory configured with physical starting address equal to 0.

**9.10.2.2 Prerequisites** – The following prerequisites must be met before using ESCCB.

1. Execute MA780 microdiagnostics without error.
2. CPU kernel completely functional.

**9.10.2.3 Running ESCCB Exerciser** – Use the following sequence to run the exerciser.

1. Load the diagnostic supervisor into each CPU to be exercised.
2. Load the program ESCCB into each CPU to be exercised.
3. Attach the MA780 multiport memories to be tested using the diagnostic supervisor command ATTACH.
4. Select the MA780 to be exercised and give the START command.

### **9.10.3 UETP**

After ESCCB has been executed without error, run the UETP program. The *VAX/VMS UETP User's Guide* describes the procedure for using UETP.

## APPENDIX

The following is the CPU cabinet assembly procedure for a three-system configuration, using the H9504-XE joiner kit. Use Engineering Drawing SA-H9504-XE-2 as a reference during the following assembly sequence.

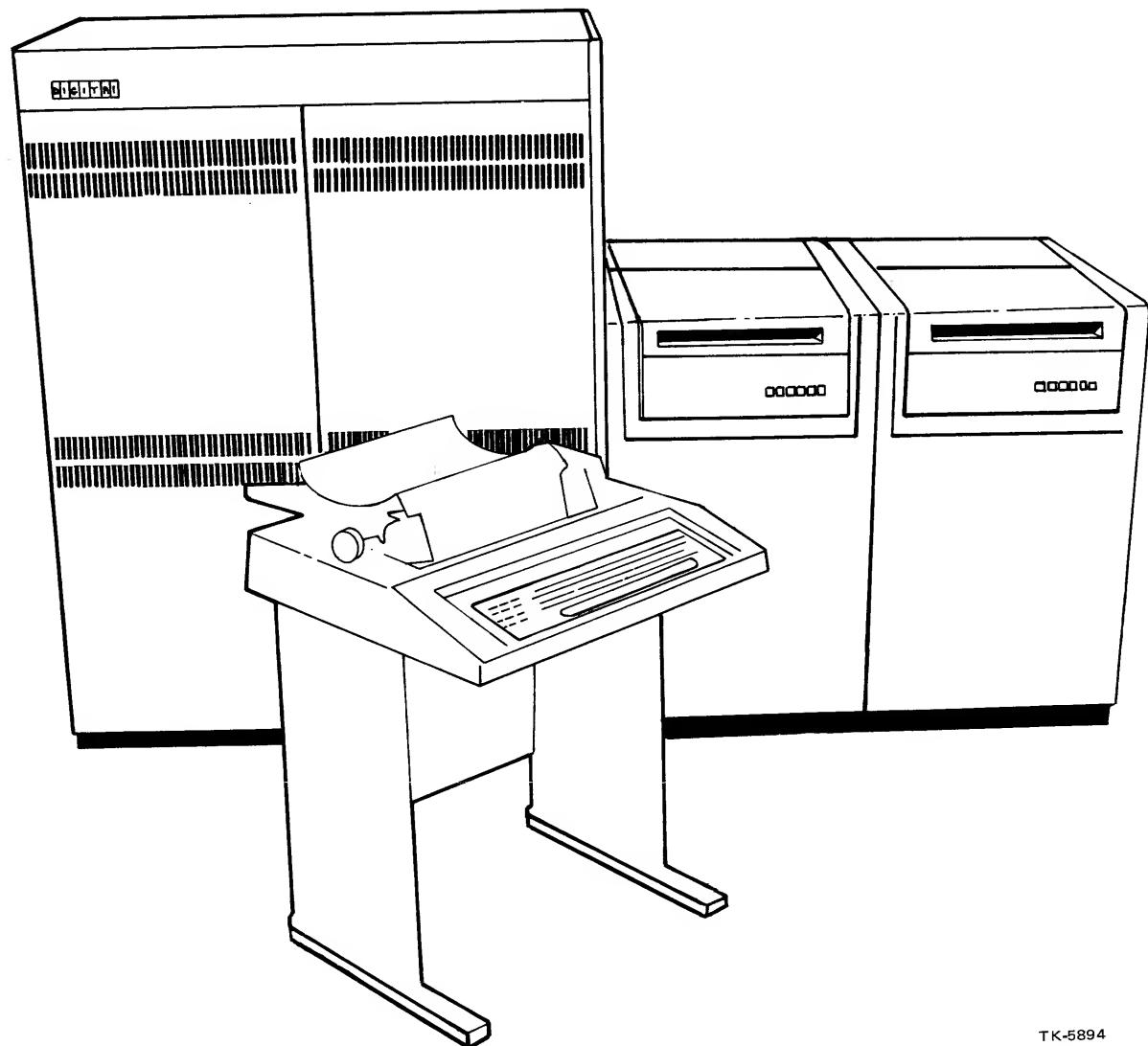
- a. Install vertical and top filler strips on the three CPU/SBI expander cabinet units (Figure 9-5).
- b. Install two key buttons (Figure 9-6) on each of the two CPU/SBI expander cabinet units and MA780 cabinet that are adjacent to the H9504-XE.
- c. Install the two vertical frame members on the CPU/SBI expander cabinet unit which is on the leg of the "T" (Figure 9-7).
- d. Position the two cabinets that form the crossbar of the "T" arrangement to allow installation of the square frame assembly.
- e. Fasten the two square frame assemblies to the key buttons of the crossbar cabinets (Figure 9-8). Fasten the square frame assembly to the vertical frames of the "T" leg.
- f. Loosely mount the two top cover brackets to the top of the two square frame assemblies (Figure 9-9).
- g. A front door is to be attached to the open side of the H9504-XE. Assemble and install the door lock to the left side of the square frame assembly (Figure 9-10).
- h. The two front cover brackets go on the same side of the square frame assembly as the door lock. Attach the two key buttons to each of the two front cover brackets. Fasten one front cover bracket to the square frame assembly (Figure 9-11). Attach the other bracket to the bottom left of the square frame assembly.
- i. Install the two hinge mounting brackets and the front door hinge on the right side of the front square frame assembly (Figure 9-12).
- j. Install the pan bottom on the bottom of the frame assembly, aligning the holes in the pan plate to the screw studs on the bottom of the frames. Fasten in place with 10-32 kep nuts.
- k. Place the top panel cover over the top cover bracket and fasten with the two locking studs. Fasten the top panel brackets to the square frame assembly, by tightening the screws placed there is step f.

**PART III**  
**UNIBUS VAX-11/780 CU/CV**

## CHAPTER 10 INSTALLATION

### 10.1 GENERAL

The UNIBUS VAX-11/780 CU/CV system (Figure 10-1) consists of a single, double-width highboy CPU cabinet, two dedicated RK07 disk-drive units, and an LA120 console terminal. Figure 10-2 shows a typical setup. Installation consists of unpacking the equipment and then leveling the CPU cabinets, installing an I/O panel assembly, and checking the primary power source. The terminal is installed next, along with any peripherals.



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Figure 10-1 UNIBUS VAX RK07 Disk-Based System  
(VAX-11/780 CU/CV)

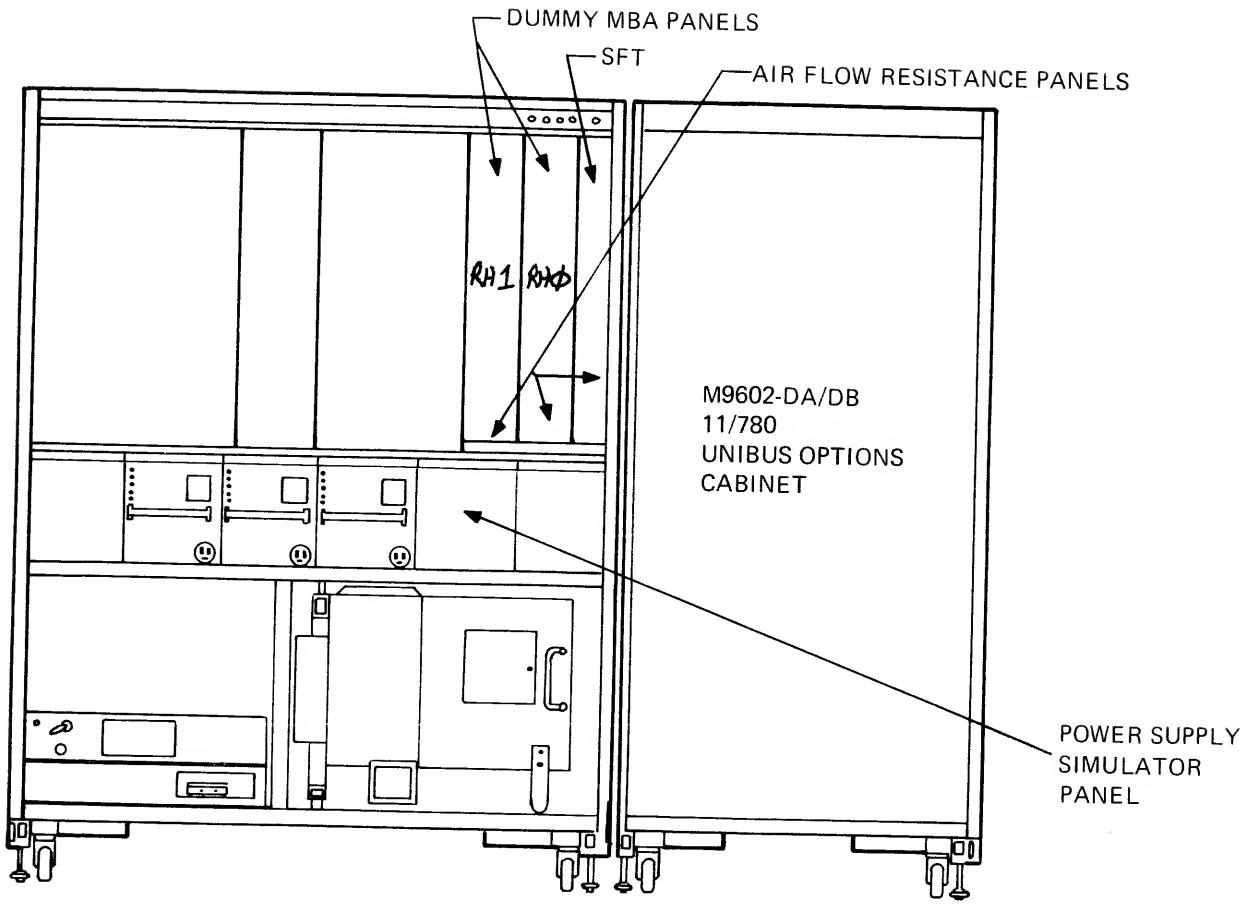


Figure 10-2 Standard VAX (SV-AXHHA) Cabinet Configuration (Front View)

## 10.2 UNPACKING AND INSPECTION

Unpack and inspect the equipment (paragraph 1.1, Part I).

## 10.3 CPU CABINET LEVELING

1. Insert leveler feet into the brackets at the four corners of the cabinet with a 9/16-inch wrench and then lower the four feet until most of the cabinet weight rests on the feet.
2. Level the cabinet via the leveling feet and a spirit level.

### NOTE

If cabinet is not level the front doors will not align.

3. Lower the pads on the stabilizer arms until light contact is made with the floor. The arms should still be free to slide.

## 10.4 I/O PANEL ASSEMBLY INSTALLATION

1. Install the special I/O panel assembly (Figure 10-3) onto brackets located between the 869 power controller and the H317 distribution box.

### NOTE

**The special I/O panel assembly is shipped in an already-wired condition, but unmouted. It is wrapped and packed near its mounting brackets at the back of the cabinet.**

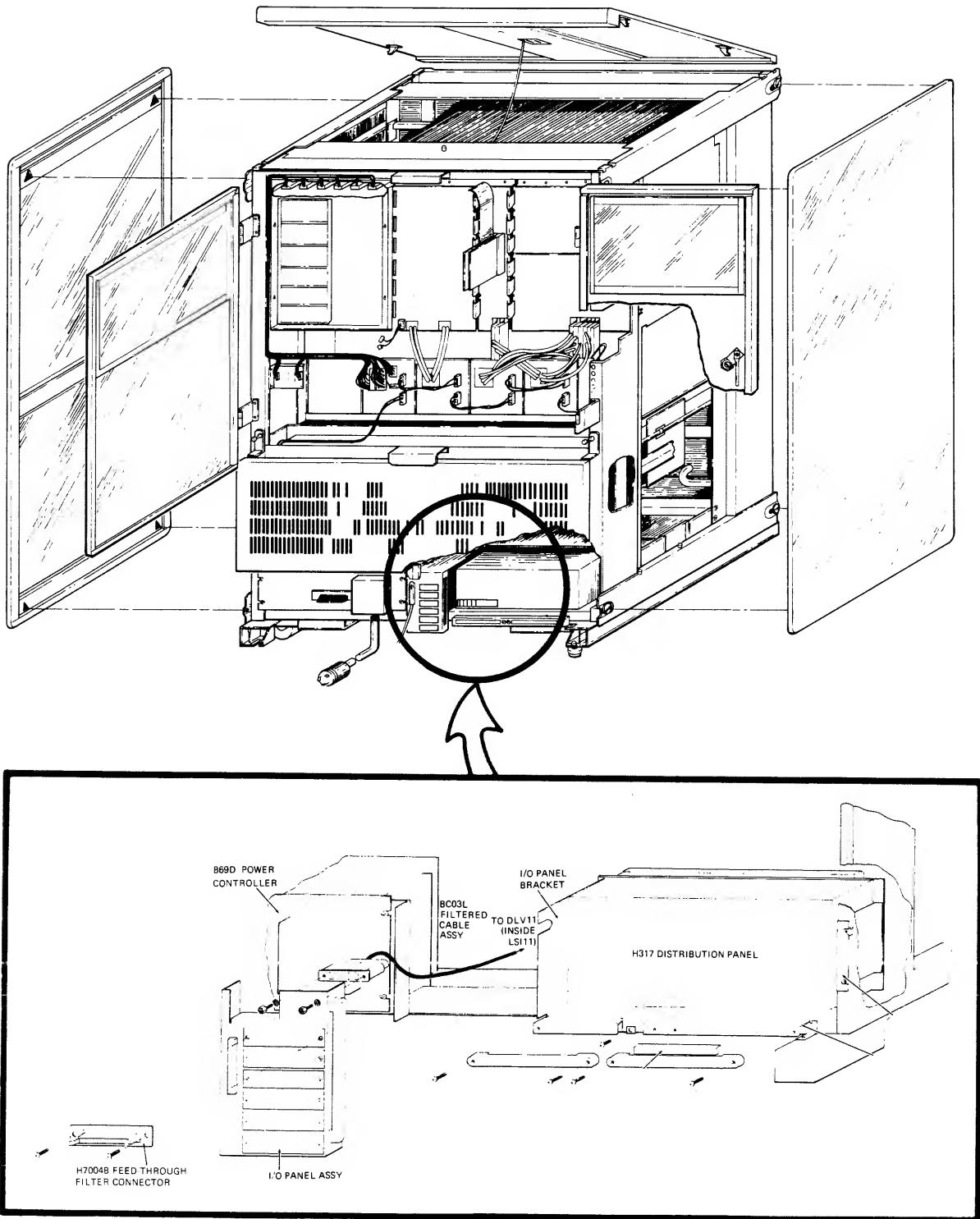
2. Fasten the I/O panel assembly in place with the four SEMS hex 6-32 × 0.38-inch screws packaged with the I/O panel.

## 10.5 POWER CHECK

Check the ac power receptacles per Part I to make sure they meet specifications.

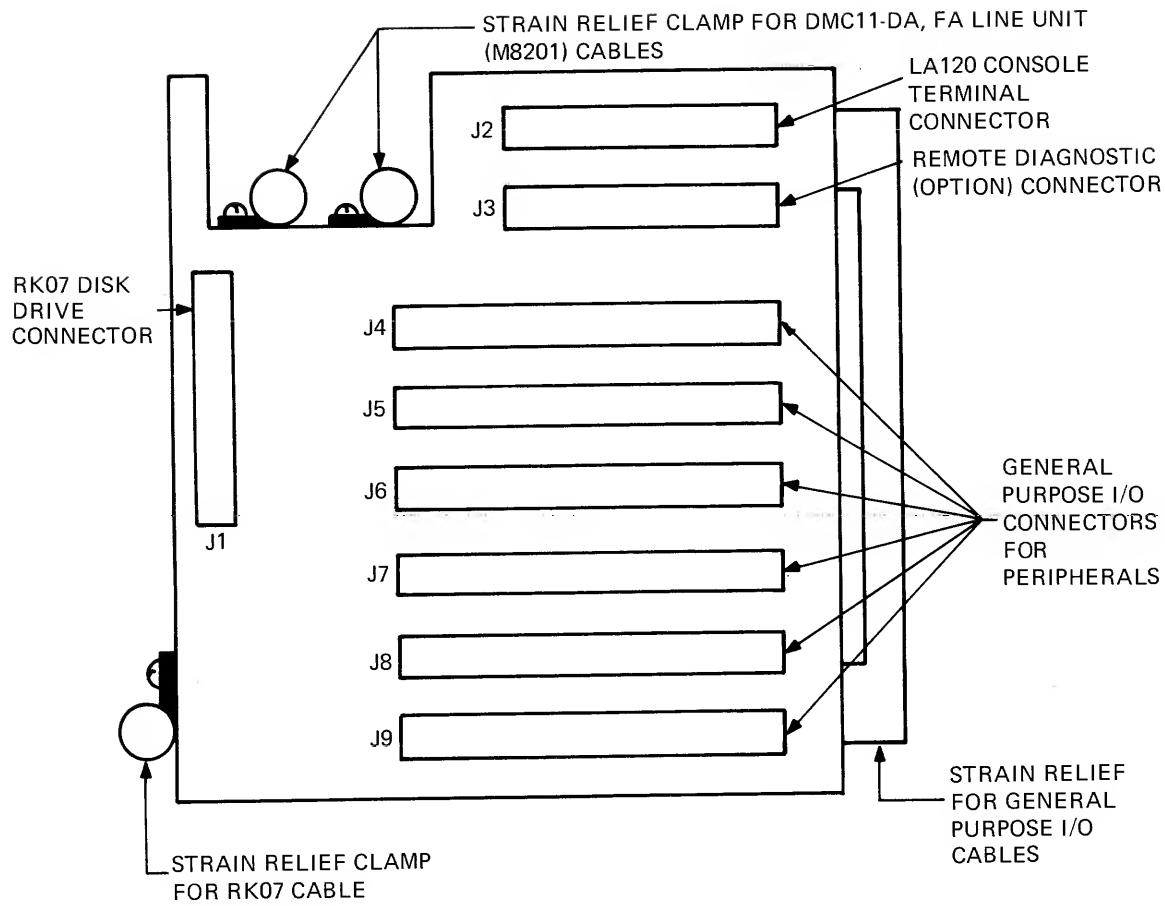
## 10.6 CONSOLE TERMINAL INSTALLATION

1. Cut and remove the nylon retaining straps from around the LA120 shipping container.
2. Remove the outer cardboard shipping container and all packing material.
3. Remove the hex-head bolts that hold the wood leg brace to the skid assembly.
4. Carefully inspect the LA120 cabinet and carriage assembly for possible shipping damage. Inspect and check the enclosed packing list for lost or missing items. Report any damaged or missing items to the local DIGITAL field service or sales office and the local carrier.
5. Remove the printer from the wooden shipping skid and place it in position.
6. Lift the LA120 top cover assembly and cut and remove the tie holding the print head assembly.
7. Install and adjust the leveling feet on the legs.
8. Plug the LA120 I/O cable into connector J2 of the special I/O panel assembly (Figure 10-4).
9. The LA120 setup label is in the package with the *LA120 User's Guide* (EK-LA120-UG-001). The label can be fastened to the area provided in the space to the left of the keyboard.



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Figure 10-3 I/O Panel Assembly Details



TK-5886

Figure 10-4 I/O Panel Assembly Connectors

## 10.7 INTERCABINET CABLING AND INSTALLATION OF PERIPHERAL DEVICES

1. Remove the air exhaust plenum (Figure 10-5) from the back of the CPU cabinet.
2. Untape and uncoil the power cable stored at the bottom back of the CPU cabinet.

### NOTE

**Do not plug the CPU's primary main power cable into the customer's three-phase ac source until all power checks have been completed.**

3. Install cabling between the two RK07s per installation instructions in the *RK06/07 User's Guide* (EK-RK067-UG).
4. Install the cabling between the first RK07 and the CPU cabinet. The dedicated connector on the I/O panel assembly for the first RK07 is J1 (Figure 10-4). Pass the cable from front to back through the strain relief (shown in the figure) before completing the connection at J1.

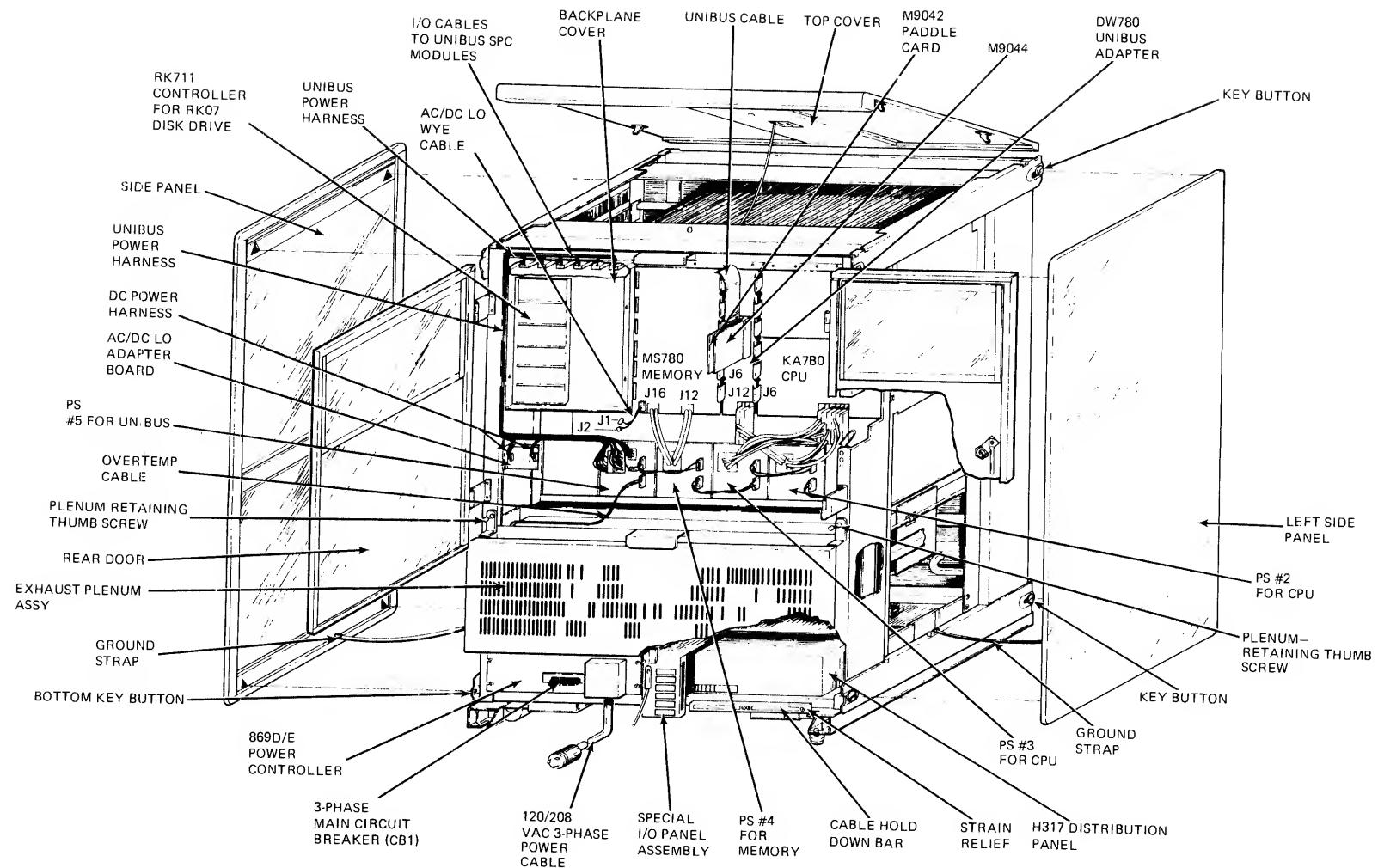


Figure 10-5 UNIBUS VAX Major Assemblies (Cabinet Back View)

5. Connect the ground cable between the first RK07 and the CPU cabinet.
6. If the remote diagnostic option is used, cable it to the CPU cabinet via dedicated connector J3 on the I/O panel assembly in the KC780.
7. If additional UNIBUS-option peripherals are to be installed, each peripheral must be connected to the CPU cabinet via an H7004B, 40-pin filtered connector that must be installed in one of the six connector slots (J4 through J9) on the I/O panel.
8. After cabling any peripherals present, enter their I/O location (J4 through J9) on the allocation sticker provided on the right front upright of the cabinet, so that each peripheral connection at the I/O panel is clearly identified.
9. If the peripheral was ordered as an add on, not with the original UNIBUS VAX-11/780, the peripheral interface interconnect for that device is connected to the I/O panel half of the I/O panel connector via a BC06K mirror-image cable. The H7004B-40-pin filter and one BC06K-9K cable needed to complete the installation of the peripheral are supplied with the option.
10. If the DMC11-DA is present, fasten its cables with the two clamps mounted in the cutout space of the I/O connector panel assembly.
11. Make sure the following information on the module slot sticker for the UNIBUS controller (SPC) modules is entered correctly.
  - Module type
  - Module location
  - Address
  - Vector information
12. If video terminals are to be connected to the UNIBUS VAX-11/780, use the eight-pair terminal connections provided by the H317 distribution box located at the bottom right of the CPU cabinet as seen from the back of the cabinet.

## CHAPTER 11 SYSTEM TEST

### 11.1 SYSTEM TURN-ON

Turn on the system as described in 2.1.

### 11.2 DIAGNOSTICS

Run the following diskettes:

ESZAC  
ESZAD  
EVKAA  
ESSAA-DS  
EVKAB  
EVKAC  
EVKAD  
EVKAE  
ESCBA  
EVDEA through EVDEF  
EVFEG  
EVRAC  
EVRAA  
EVDAA

**PART IV**  
**UNIBUS VAX-11/780 Conversion to Standard VAX-11/780**

## CHAPTER 12

### SYSTEM CONVERSION

#### 12.1 GENERAL

Installing the H9604-BA/BB UNIBUS-VAX Field Upgrade Kit converts a UNIBUS VAX-11/780 CU/CV system to a standard VAX-11/780 CA/CD system. This enables MASSBUS peripherals to be used with the system.

The conversion kit consists of an H9602-DE UNIBUS expander cabinet and modification hardware. To convert the UNIBUS VAX-11/780:

1. Remove all UNIBUS options from the UNIBUS VAX CPU cabinet and install them in the BA11-K mounting box of the UNIBUS expander cabinet.
2. Remove the back panels that are no longer necessary.
3. Remove the H7100 power supply with H7105 regulator.

#### NOTE

After these field changes, the resulting configuration is identical to the VAX SV-AXHHA system package.

#### 12.2 UNIBUS VAX-11/780 HARDWARE REMOVAL

1. Turn off all system primary power at the customer facility main power panel or at the three-phase circuit breaker on the front panel of the 869D/E three-phase primary circuit breaker.
2. Reach up inside the cabinet and rotate the fastener (Figure 1-5) at the back, under the cover, a quarter turn counterclockwise. Then push the cover up and forward.

#### CAUTION

Do not apply power to the system; the released fastener hangs by the wire attaching it to the top cover and could cause an electrical short.

3. Remove the cabinet end panels.
4. Remove the top and bottom key buttons from the right side of the cabinet.
5. Remove the exhaust plenum assembly.

6. Disconnect all peripheral cables from the I/O panel assembly (P/N 74-19159) located between the power controller and the 11317 distribution panel.
7. Disconnect and/or remove all I/O cables connected to the UNIBUS special purpose controller (SPC) modules. At the top of the card cage, remove the upper most cables first, then proceed downward to remove the remaining cables.
8. Remove the M9042 paddle card (Figure 12-1) from the back of the DW780 backplane.

**NOTE**  
**Do not disconnect any cables from the paddle card.**

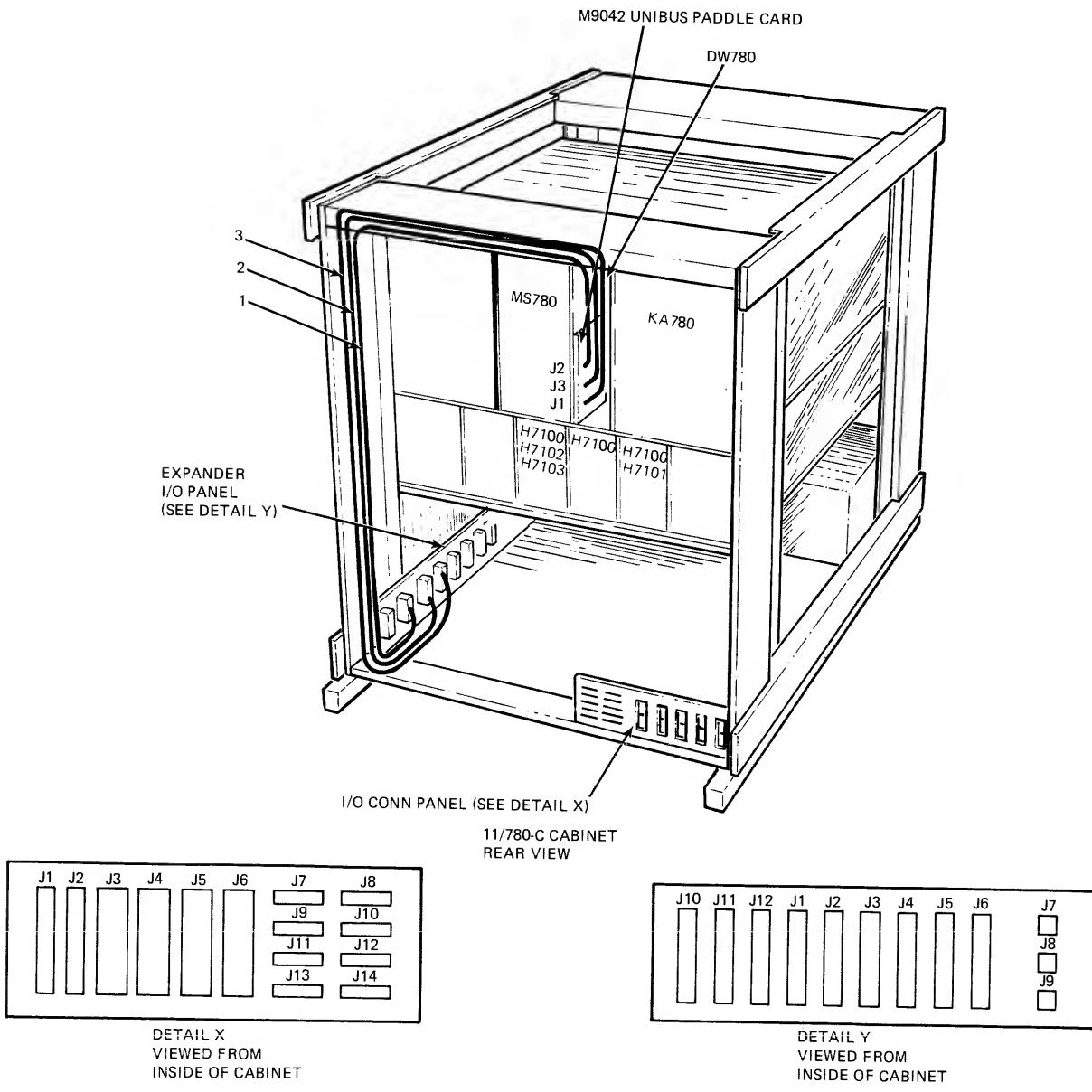
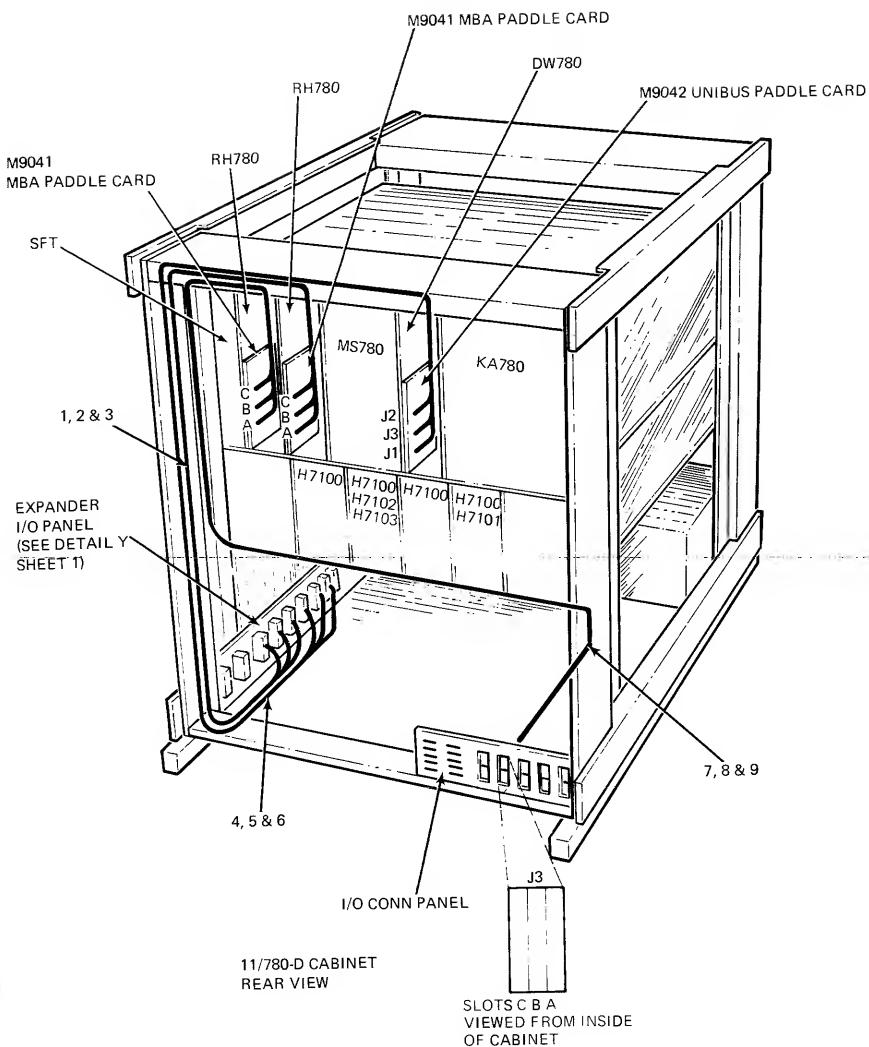


Figure 12-1 VAX-11/780 System Interconnect Diagram  
(Sheet 1 of 2)



ITEM NO. (REF. ONLY)	11/780-CA, CC, CD			
	PART NO.	DESCRIPTION	FROM	TO
1	7013622-00	CABLE, RIBBON UNIBUS	M9042-J2	EXP I/O CONN-J3
2			M9042-J3	EXP I/O CONN-J1
3			M9042-J1	EXP I/O CONN-J2

ITEM NO. (REF. ONLY)	11/780-D			
	PART NO.	DESCRIPTION	FROM	TO
1	7013622-0	CABLE, RIBBON UNIBUS	M9042-J2	EXP I/O CONN-J3
2			M9042-J3	EXP I/O CONN-J1
3			M9042-J1	EXP I/O CONN-J2
4	BC06R-10	I/O CABLE	M9041-C	EXP I/O CONN-J4
5			M9041-B	EXP I/O CONN-J5
6			M9041-A	EXP I/O CONN-J6
7	BC06R-10	I/O CABLE	M9041-C	I/O CONN-J3 SLOT C
8			M9041-B	SLOT B
9			M9041-A	SLOT A

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Figure 12-1 VAX-11/780 System Interconnect Diagram  
(Sheet 2 of 2)

10. Starting at the DD11 backplane, remove the three foam-backed BC05L-08 UNIBUS cables running between slot AB0 on the backplane and the M9042 UBA paddle card.
11. Disconnect all user terminal cables from the H317 distribution panel. For later reference, note all line numbers and line destinations.
12. Disconnect all connectors and/or cables attached to the back of power supply 5.
13. Disconnect all connectors of the dc power harness leading to the UNIBUS backplanes and the ac/dc lo adapter board.
14. Disconnect and remove the ac/dc lo wye cable at J16 on the MS780 backplane.
15. Remove the UNIBUS power harness from the cabinet.
16. Release the slide latch at the back of power supply 5.
17. Disconnect the ac line cord and retainer screw at the front of the supply, then remove the power supply.
18. Remove the ac/dc lo adapter board and bracket from the cabinet.
19. Remove the plexiglass cover and all modules from the UNIBUS card cage. Note the configuration and/or position of all removed modules for later reference.
20. Remove the M9040 module from slot 1 of the MS780 memory backplane.
21. Remove all system (modules) units plugged into the backplane of the DW780 UBA assembly.
22. Remove the three screws at the top back of the DW780 UBA assembly. Remove three screws from the bottom, and then remove the assembly.
23. Disconnect all cables and connectors from the I/O panel assembly.
24. Remove the I/O panel assembly from the cabinet.
25. Remove the H317 distribution panel.
26. Remove the H317 panel bracket.
27. Remove the I/O panel assembly bracket.

### **12.3 STANDARD VAX-11/780 HARDWARE INSTALLATION**

1. Install the power supply simulator panel (P/N E-AD-7014238-0-0) (Figure 10-2), using 8-32  $\times$  0.25-inch SEMS screws (P/N 9009642-00).
2. Install the panel mounting bracket (Figure 12-2) between the 869D/E power controller and the back I/O panel using 10-32  $\times$  0.50-inch screws (P/N 9009700-00) and 10-32 kep nuts (P/N 9006565-00).
3. Connect the 869D/E power controller to the panel mounting bracket.

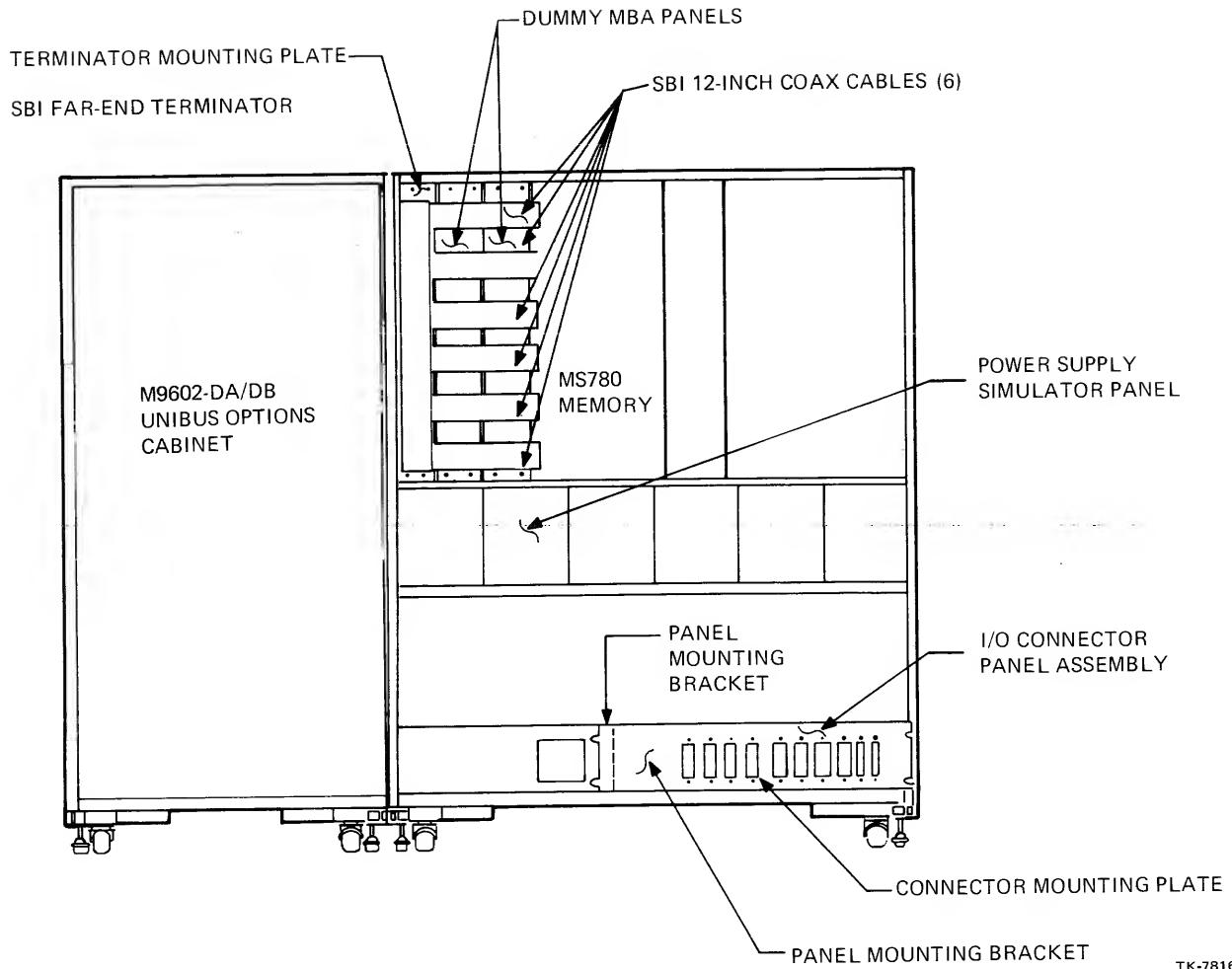


Figure 12-2 Standard VAX (SV-AXHHA) Cabinet Configuration

4. Install the back I/O connector panel assembly (Figure 12-2) using 10-32  $\times$  0.50-inch screws (P/N 9009700-00) with a "U" nut retainer (P/N 9007786).
5. Install three airflow resistance panels (P/N 74-18974-00) (Figure 10-2) in the CPU cabinet using 8-32  $\times$  0.25-inch SEMS screws (P/N 9009642-00). Position the flanges toward the back of the cabinet, pointing up.
6. Install the terminator mounting plate (P/N 74-18975-00) (Figure 12-2) in the CPU cabinet at a location as far as possible from the MS780 memory backplane. Use 8-32  $\times$  0.25-inch SEMS screws (P/N 9009642-00) and face the standoffs toward the back of the cabinet.
7. Install the SBI far end terminator (SFT) and the SBI terminator cover on the terminator mounting plate (Figure 12-2) using the following hardware:
  - Three plastic terminator cover mounting blocks (P/N 7419456-0-0)
  - Three fiber spacers (P/N 9007831-00)
  - Six 6-32  $\times$  1.38-inch screws (P/N 9008911-01)
  - Four 6-32  $\times$  0.94-inch screws (P/N 9007838-01)
  - Four nylon washers (P/N 906707-00)

8. Install two dummy MBA panels (Figure 12-2) in the option slots between the MS780 memory and SBI terminator, using 8-32 × 0.25-inch screws (P/N 9009642-00).
9. Connect six 12-inch SBI coaxial cables between the SBI connectors of the MS780 memory and the SBI connectors of SBI terminator M9043.
10. Install the BC03L-05 console cable (P/N 7013622) in the J7 cutout of the I/O connector panel assembly. Use the mounting plate (P/N 7414072-0-0) supplied and the connector mounting plate.
11. Reinstall the M9042 paddle card at the back of the UBA backplane. The cable connections to this card are J1 to P1, J2 to P2 and J3 to P3.
12. Tiewrap the UNIBUS cables to the frame upright on the left side.
13. Tiewrap the grey ribbon cables for the LSI console and KA780 of the console subsystem to the frame upright on the right side.
14. Connect P7 (Figures 12-3 and 12-4) of the -5 Vdc terminator harness (P/N 7015073-00) to J7 of SBI far end terminator M9043.
15. Connect P2 (an unmarked 3-pin connector with yellow, purple and black leads) of both ac/dc lo cables (P/N 7014212-2M) to J8 and J9 of the M9043 far end terminator; tiewrap to stick-on pads.
16. Remove the 8 inch long cable (P/N 14213-OK) from jack J4 of power supply 4.
17. Install the overtemperature shutdown cable between the 869D/E power controller and J4 of power supply 4. Take up the slack for this connection.
18. Install all system units and modules (specifically those that were installed in the special card cage of the single-cabinet UNIBUS VAX configuration) in the BA11-K mounting box of the M9602-D cabinet. Maintain the same physical order that existed in the UNIBUS VAX configuration.
19. Bolt the H9602-D expander cabinet to the CPU cabinet.

**NOTE**

**Prior to bolting the cabinet, interconnect cabling between the CPU cabinet and the H9602-D cabinet must be completed (especially the UNIBUS cables to the cabinet I/O panel).**

20. Connect all user terminals to the H317 distribution panel of the H9602-D cabinet. Retain the order that existed in the UNIBUS VAX configuration.

#### **12.4 DIAGNOSTICS**

Run the diagnostics listed in Table 2-1.

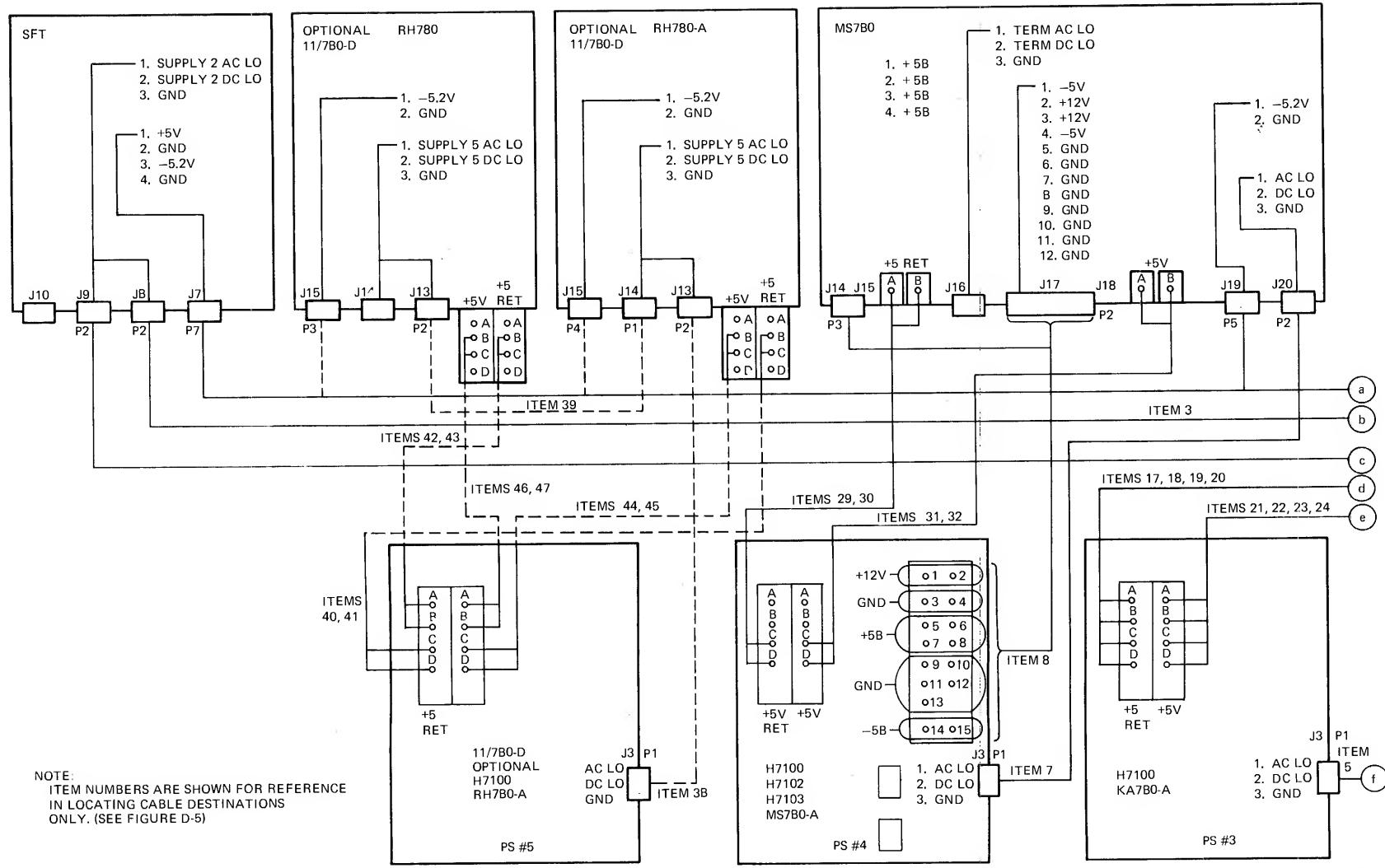


Figure 12-3 VAX-11/780 Subsystem Backplane DC Interconnect Diagram (Sheet 1 of 2)

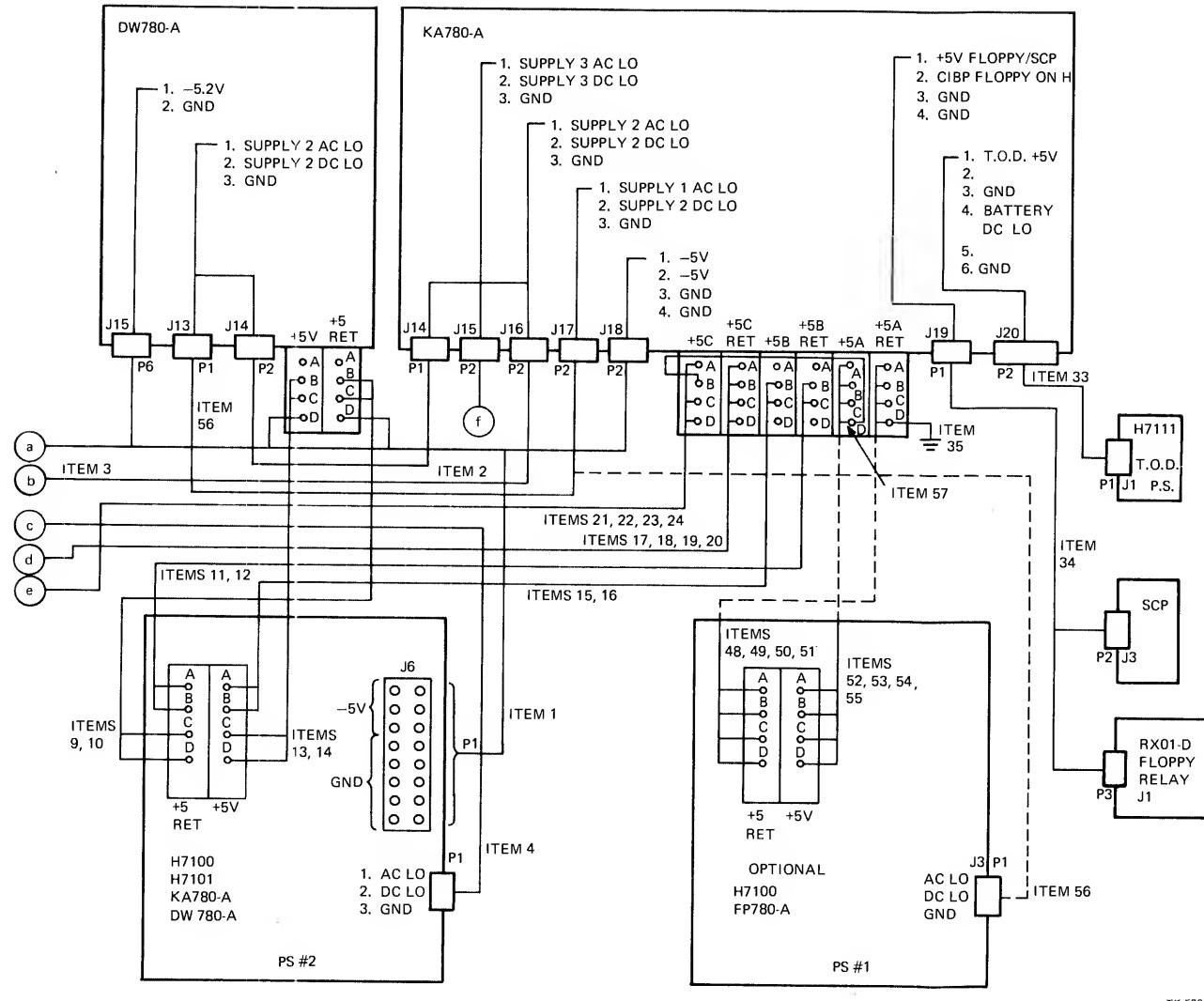


Figure 12-3 VAX-11/780 Subsystem Backplane DC Interconnect Diagram (Sheet 2 of 2)

REF ITEM NUMBER	PART NUMBER	DESCRIPTION	FROM	TO	REMARKS
1	7015073-0-0	HARNESS -5V TERMINATOR	HARNESS P1	PS #2-J6	-5V GND
		HARNESS P2	KA780-J18		
		HARNESS P5	MS780-J19		
		HARNESS P6	DW780-J15	-5V, GND	
		HARNESS P7	SFT-J7	±5V, GND	
		HARNESS RING TERM (RED WIRE)	DW780+5V-D	+5V	
	7015073-0-0	HARNESS -5V TERM	HARNESS RING TERM (BLK WIRE)	DW780+5VRT-D	+5V RETURN
2	7014212-0H	CABLE AC DC LOW	CABLE P1	KA780-J14	
			CABLE P2	DW780-J14	
3	7014212-2M	CABLE AC DC LOW	CABLE P1	KA780-J16	
			CABLE P2	SFT-J8	
-4	7014212-2M	CABLE AC DC LOW	CABLE P1	PS #2-J3	AC DC LOW GND
			CABLE P2	SFT-J9	
5	7014212-0M	CABLE AC DC LOW	CABLE P1	PS #3-J3	AC DC LOW & GND
			P2	KA780-J15	
7	704212-1C	CABLE AC DC LOW	CABLE P1	PS #4-J3	AC DC LOW & GND
			P2	MS780-J20	
8	7014234-0K	CABLE ±5B & +12	CABLE P1	PS #4-J7	+5B & +12
			P2	MS780-J17	
			P3	MS780-J14	
9	7014249-1A	CABLE POWER (BLK)	PS #2 + 5 RET-D	DW780+5 RET -B	PS #2 + 5 RETURN
10	7014249-1A	CABLE POWER (BLK)	PS #2 + 5 RET-C	DW780 + 5 RET -C	
11	7014249-1C	CABLE POWER (BLK)	PS #2 + 5 RET-B	KA780 +5B RET-B	
12	7014249-1C	CABLE POWER (BLK)	PS #2 + 5 RET-A	KA780 +5B RET-C	PS #2 + 5 RETURN
13	7014530-1A	CABLE POWER (RED)	PS #2 + 5 D	DW780 +5 -B	PS #2 + 5
14			C	DW780 +5 -C	
15	7014530-1A	CABLE POWER (RED)	PS #2 + 5 B	KA780 +5B C	
16	7014530-1A	CABLE POWER (RED)	PS #2 + 5 A	KA780 +5B B	PS #2 + 5
17	7014249-1J	CABLE POWER (BLK)	PS #3 + 5 RET D	KA780 +5C RET D	PS #3 + 5 RETURN
18			C	C	
19			B	B	
20	7014249-1J	CABLE POWER (BLK)	PS # 3 + 5 RET A	KA780 +5C -A	PS # 3 + 5 RETURN
21	7014530-1E	CABLE POWER (RED)	PS # 3 + 5 -D	KA780 +5C -D	PS # 3 + 5 RETURN
22			C	C	
23			B	B	
24	7014530-1E	CABLE POWER (RED)	PS # 3 + 5 A	KA780 +5C -A	
29	7014250-0K	CABLE POWER	PS # 4 + 5 RET C	MS780-J15-A	PS #4 + 5 RETURN
30	7014250-0K	RTR MEMORY BLK	PS # 4 + 5 RET D	MS780-J15 B	
31	7014529-0K	CABLE POWER	PS # 4 + 5 C	MS780-J18-A	PS # 4 + 5V
32		+5 MEMORY (RED)	PS # 4 + 5 D	MS780-J18 B	
33	7014248-3M	CABLE TO T. O. D. BAT.	HARNESS P2	KA780-J20	
			P1	H7111-J1	
34	7014243-21	FLOPPY RELAY SC PWR HARNESS	HARNESS P1	KA780-J19	
			P2	SCP-J3	
			P3	RX01-J1	
35	7014249-0L	CABLE POWER (BLK)	KA780-A+5A RET D	FRAME	
56	7014212-0M	CABLE AC/DC LO	CABLE P1	DW780-J13	SEE NOTE 2
			CABLE P2	KA780-J17	

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## Figure 12-4 VAX-11/780 Subsystem Cable Configuration Guide (Sheet 1 of 2)

11/780 - D

REF ITEM NUMBER	PART NUMBER	DESCRIPTION	FROM	TO	REMARKS
1	7015073-0-0	HARNESS-5V TERM	HARNESS P3	RH780-J15	-5V GND
1	7015073-0-0	HARNESS-5V TERM	HARNESS P4	RH780-A-J15	-5V GND
38	7014212-0M	CABLE AC DC LOW	CABLE P1	PS #5-J3	AC DC LO & GND
	7014212-0M	CABLE AC DC LOW	CABLE P2	RH780-J13	AC DC LO & GND
39	7014212-0H	CABLE AC DC LOW	CABLE P1	RH780-A-J14	AC DC LO & GND
	7014212-0H	CABLE AC DC LOW	CABLE P2	RH780-J13	AC DC LO & GND
40	7014249-0L	CABLE POWER (BLK)	PS #5 + 5 RET-D	RH780-A + 5 RET C	PS #5 + 5 RETURN
41			C	B	
42	7014249-0L	CABLE POWER (BLK)	PS #5 + 5 RET-B	RH780 A + 5-C	PS #5 + 5 RETURN
43			A	B	
44	7014530-0L	CABLE POWER (RED)	PS #5 + 5 -D	RH780 A + 5-C	PS #5 + 5V
45			C	B	
46	7014530-0L	CABLE POWER (RED)	PS #5 + 5-B	RH780 + 5-C	PS #5 + 5V
47			A	B	

## FP780 OR FP780 &amp; KU780

48	7014249-0L	POWER CABLE BLK	PS #1 + 5 A RET D	KA780 + 5 A RET D	PS #1 + 5 RETURN
49			C	C	
50			B	B	
51	7014249-0L	POWER CABLE (BLK)	PS #1 + 5 A RET-A	KA780 + 5A RET A	PS #1 + 5 RETURN
52	7014530-0L	POWER CABLE (RED)	PS #1 + 5 D	KA780 + 5A -D	PS #1 + 5V
53			C	C	
54			B	B	
55	7014530-0L	POWER CABLE (RED)	PS # 1 + 5 A	KA780 +5A A	PS #1 + 5V
56	7014212-0M	CABLE AC DC LO	CABLE P1	PS #1 J3	AC, DC, LOW
			P2	KA780-J17	

SEE NOTE 2

## KC780 OR KU780

SEE NOTE 1

57	7014530-0L	CABLE POWER (RED)	KA780-A + 5A D	KA780-A + 5C B	PS #2 + 5V
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## NOTES:

1. IF THE FP780 IS INSTALLED, REMOVE ITEM 57.
2. IF THE FP780 IS INSTALLED, ITEM #56 P1 CONNECTS TO PS #1-J3, OTHERWISE IT IS CONNECTED TO DW780-J13.

TK-5888

Figure 12-4 VAX-11/780 Subsystem Cable Configuration Guide  
(Sheet 2 of 2)

**Reader's Comments****VAX-11/780 INSTALLATION****MANUAL****EK-SI780-IN-002**

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What features are most useful? \_\_\_\_\_

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What faults or errors have you found in the manual? \_\_\_\_\_

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